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PERSONAL HYGIENE

AND

PHYSICAL TRAINING FOR WOMEN

BY

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In Loving Memory

of

HELEN WORTHING WEBSTER, M.D.

Professor of Physiology and Hygiene and Resident Physician at Vassar College
from 1874 to 1881

An untiring worker of charming and inspiring personality
the living embodiment of all that was womanly,
great hearted, and noble
This book is affectionately dedicated as a slight tribute of
the esteem in which she was held, and in grateful acknowl-
edgment of the value of her teachings
By her former pupil
THE AUTHOR

PREFACE

THE aim of this work has been to present in a clear and concise manner the fundamental physiological laws on which all personal hygiene is based; together with the practical, detailed directions for the proper development of the body and the training of the physical powers to their highest degree of efficiency by means of fresh air, tonic baths, proper food and clothing, gymnastic and outdoor exercise, so that the tissues will be placed in the best possible condition to resist disease.

The spirit of the times demands nothing less than the most perfect development of body and mind of which youth is capable, and maintaining the highest degree of efficiency of the adult worker for the longest possible term of years. The *fiat* has gone forth from the American Medical Association for the scientific education of the public in the laws of hygiene and sanitation. And the great civic movement inaugurated by that same Association and the Committee of One Hundred on National Health for the establishment of a National Department of Public Health, promises to be crowned with success in the near future. And so it has been deemed superfluous to expound at length what preventive medicine has already accomplished in the short space of fifty years by the eradication of terrible epidemics and many diseases,

a general knowledge of applied hygiene might be expected to accomplish in the near future.
the author great pleasure to have this oppor-
xpressing her deep indebtedness to Miss Ruth
rn, Vassar College, A. B., 1909, of Englewood,
st artistic and graceful dancer who posed for
trations; and to Miss Harriet I. Ballintine, the
or of the Vassar College Gymnasium, who ar-
poses for the very excellent plates illustrating
ercises and classic dances. Also to the Vassar
letic Association for 1908–09 for the especially
ances and field sports which they were so ex-
d as to demonstrate for her benefit.

ANNA M. GALBRAITH.

K CITY, *January*, 1911.

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CHAPTER I

HYDROTHERAPY

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The term hydrotherapy will be used here in its broadest sense, and may be defined as the hygienic and systematic use of water, both externally and internally, for the preservation and restoration of health and the prevention of disease.

The hygienic and therapeutic value of the systematic use of water is just beginning to be appreciated by the medical profession. When this newly acquired knowledge is put to practical use by the great masses of the people, there will be a greatly diminished necessity for the use of drugs. Indeed, water has been pronounced by a high

medical authority to be, and probably is, more nearly a panacea for all human ills than any other known agent.

The bath is generally considered merely as a cleansing procedure, whereas this is only one of its beneficial effects. There is, in addition, the stimulation of all the functions and organs of the body obtained through the temperature of the water, and the mechanical stimulation which is obtained by the mode of application.

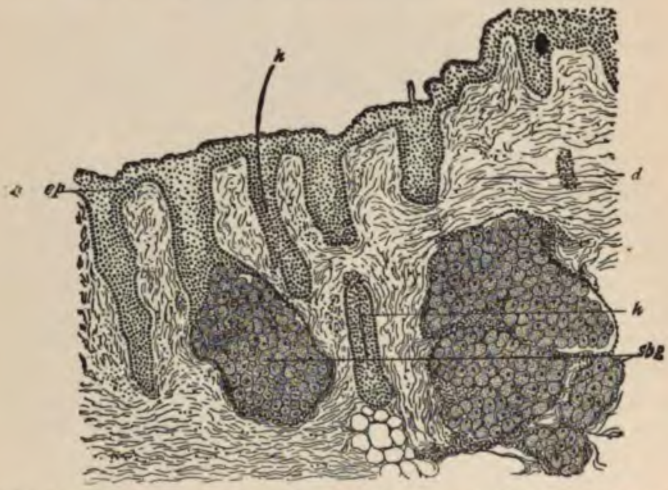

Fig. 1.—Vertical section of skin: *sbg*, Sebaceous glands; *ep*, epidermis; *h*, hair; *d*, derma (Fox).

Again, the skin is not a mere covering for the body, but one of its most important organs, with well-defined functions ; so that, in order to obtain a clear understanding of the subject, it is necessary first to consider briefly the functions of the skin; and, secondly, the physiologic action of water.

Description of the Skin.—The skin is a very sensitive and complex organ, and upon the condition of the skin and the vicissitudes to which it is exposed the health of the individual is dependent to a very great degree.

The skin is composed of three distinct layers—the epidermis, the corium or true skin, and the subcutaneous connective tissue. The appendages of the skin are the hair, nails, the sebaceous and sweat-glands. This complicated structure is supplied with blood-vessels, lymphatics, and nerves.

The Epidermis.—The outer layer of this is the horny layer; when a blister is formed, its fluid raises the entire epidermis from the true skin. The flat scales forming the horny layer are continually being thrown off; this process of desquamation is increased by the friction of the clothes, of bathing, massage, and so forth, and is as constantly being replaced by new cells from underneath.

The *corium*, or true skin, is the most important part of the integument. This is a thick, felt-like tissue which is pierced in all directions for the passage of the blood-vessels, lymphatics, sweat-ducts, and nerves, and affords lodgment for the hair follicles and sebaceous glands. The tension of the skin is produced by its muscular structure and elastic network, and is subject to temperature changes. This power of contractility is known as the tone of the skin.

The skin has two kinds of glands, the sebaceous and sweat-glands. The sebaceous glands consist of a gland structure, with a short excretory duct, which opens upon the epidermis or into the hair follicles. These glands secrete an oily substance, which keeps the hair and skin soft and protects them from the sweat.

There exists in the sebaceous glands of the skin an infinite number of vulnerable points for infection, and the greater part of the process of cleanliness is directed toward their protection. If in any part of the skin there is an accumulation of bacilli, their toxins, or excretions, and, at the same point, a collection of sebum, the friction of the clothes, caused by the movements of the body, becomes an active agent in effecting their absorption by the skin. Hence, the scientific basis for the necessity of the daily bath.

bcutaneous tissue we find the fat; it is this part that contributes to the roundness and beauty 7. It is increased by abundant fatty food, abits, and freedom from care.

s of the Skin.—The skin exercises three dis- ons: first, as an organ of sense; second, as an eretion; and third, as an organ of heat regula-

ight, the sense of touch is the most important nses. Through this sense the human organism nscious of its contact with the outer world. ous nerve-endings stand guard, as it were, over functions of the human body.

rtance of the action of the skin as an organ of ill be better understood from the well-known e skin is one of the most important aids to the 'hat the perspiration and the urine are to a ent vicarious excretions has been proved.

l is the circulating medium which not only nvey nutritive materials from the stomach to

body, produce practically the same amount of heat and energy that would be generated by their combustion outside the body.

But it is essential, in order to keep the body of warm-blooded animals at a constant or normal temperature, that an increase in the heat-production should be accompanied by a corresponding increase in the heat dissipation; the functions are reciprocal, and this equilibrium is regulated and maintained by a special nervous and functional mechanism.

The automatic protective measures against the effects of heat are:

First.—Dilatation of the cutaneous vessels and an acceleration of the circulation through the skin and the subcutaneous tissue. By this means the dissipation of heat is increased; the sweat at the temperature of the blood, deposited upon the surface of the body, evaporates under favorable circumstances, and in this way considerable amounts of heat are abstracted from the body. In consequence of sweating and its evaporation, the blood circulating through the skin is cooled, and returning to the internal organs at a lowered temperature, prevents their overheating.

Second.—Should the action of heat be continued for a greater length of time, a large amount of blood will be retained in the skin in consequence of the loss of tonicity of the cutaneous vessels; the cutaneous circulation will be slowed, and thereby the blood, heated at the surface of the body, is prevented from returning to the internal organs and so overheating them.

Third.—In consequence of the accumulated amount of blood in the skin, a diminished amount of blood will remain in the internal organs; thus their activity, and thereby also the production of heat, will be lessened.

In these processes will be found a safeguard against the excessively rapid penetration of heat to the internal organs, and against the unduly rapid elevation of the body temperature through thermic influences.

As a result of the stimulating influence of cold, there first occurs contraction of the skin and its vessels. This, by restricting the dissipation of heat, brings about perfect compensation if the abstraction of heat be but slight; and but partial compensation, if the abstraction of heat is more marked. In the latter event the body temperature will continue to decline, to a greater or less degree; in the former it will remain constant.

The rôle played by the skin in maintenance of the normal temperature of the body is indispensable.

The normal temperature of the adult human body is 98.6° F. in the axilla; the temperature in the mouth is five-tenths of a degree higher than that of the axilla, and that of the rectum and vagina is one degree higher than that of the mouth.

Fasting, sleep, and short applications of heat all decrease heat-production; during sleep the temperature of the body falls half a degree or more.

Respiration by the skin varies from ½ to 1 per cent. of the total amount of oxygen taken into the body, and a somewhat lower percentage of carbonic acid is thrown off through this channel.

The skin absorbs substances in watery solutions with difficulty, on account of the oil lying upon and in the epidermis; substances dissolved in oil and rubbed in are more rapidly absorbed; absorption takes place rapidly after the skin has been washed with ether, chloroform, or alcohol.

The Physiologic Effects of Water.—These depend on whether the water is taken internally or applied externally. If applied externally, the effects will depend upon the temperature, whether hot, tepid, or cold; also on the manner of application, but, most of all, on the length of time which it is applied and the state of health of the individual.

The temperature of water is classified as very cold, from 32° to 55° F.; as cold, from 55° to 65° F.; cool, from 65° to 80° F.; tepid, 80° to 92° F.; warm, 92° to 98° F.; hot, 98° to 104° F.; very hot, 104° F. and above.

Heat.—A general hot bath produces dilatation of the vessels of the skin and contraction of the vessels of the brain; a general activity of the glands of the skin, both perspiratory and sebaceous. Perspiration may be produced, either to the degree of slight moisture or of profuse sweating, according to the length of time and the intensity of the application made. In a very hot bath the rate of perspiration may be increased from fifty to sixty times the ordinary amount. The most pronounced effect possible may be secured by either the electric light or sun bath.

Loss of fluids from the body has a depressing effect similar to, though somewhat less marked than, that produced by bleeding, so that there is a vital necessity for administering water internally before, during, and after the bath.

Prolonged and repeated perspirations induced by artificial means weaken the skin, and thus lessen its power to resist cold impressions, unless counteracted by frequent cold applications.

The general and usual reactions following the applications of heat are atonic and depressing in character. For the most part, the reactions following cold applications are to be preferred to those following hot ones.

The three great vascular areas of the body are the muscles, the portal system, and the skin. Each of these parts may be regarded as a great reservoir, capable of retaining a large part of the entire amount of blood of the body. When one of these areas is in a state of congestion, the others must be in a comparative state of anemia.

The restorative effects due to the application of heat are due partly to the elimination of fatigue poisons which is thereby encouraged, as well as by the reflex stimulation of the nerve-centers. The good effects are much more decided and lasting, and the exhausting effects neutralized, if the hot application is followed by a short cold one.

The effects of a neutral bath, 92° to 95° F., is sedative, diminishing nervous irritability.

A hot-water bottle or fomentations, placed over the stomach for an hour or two after eating, increase the gastric secretions, and, when placed over the liver, increase the flow of bile.

The Physiologic Effects of Cold.—In suitable cases a short general application of cold is a powerful heart tonic. Cold causes a contraction of the vessels of the skin and of those of the brain, with a dilatation of the internal vessels. There are pallor and coldness of the skin, and an almost instantaneous suspension of perspiration, which is dangerous only when the body is in a state of fatigue.

If the application of cold is long continued, the surface becomes blue, the temperature of the muscles beneath the skin is lowered, thus checking heat-production in these muscles; the circulation is slowed, and the heart's action is diminished in frequency. There is a gooseflesh appearance of the skin; a sensation of chilliness, trembling, shivering, chattering of the teeth; at first a quickening and then slowing of the pulse, and deep gasping respiration.

When the cold application is considerably prolonged, the tendency to reaction is suppressed. There is an exhaustion of the nerve-centers as well as of the heat-producing powers of the body. Thus, the system gradually loses its power to resist the depressing effects of cold. The repeated chillings of the body increase the length of time required to return to the normal temperature. Applications of water below the temperature of the body always lower the temperature.

Reaction.—If the application of cold is of very short duration, of very low temperature, and given under high pressure, the phenomena of reaction begin immediately on its cessation.

The reaction consists in a dilatation of the surface capillaries, with contraction of the internal vessels; redness of the skin; the skin is smooth, soft, and supple; there is a sensation of warmth, comfort, and well-being;

respiration is slower and deeper; there are a fall of the internal temperature and increase of perspiration.

Certain measures to favor reaction should be taken before the bath, such as exposure to the air of a warm room, drinking hot water, and short exercise of a rather vigorous kind.

During the bath the measures which favor reaction are short, sudden applications of cold, friction while in the bath with the hand, and pressure effects in the douche.

After the bath reaction is favored by vigorous rubbing, a thorough drying of the body, warm clothing, warm air of the room, and as vigorous exercise as the strength of the individual will permit.

Conditions which are unfavorable to healthy reaction are: old age, infancy, exhaustion, either temporary or from an excessive loss of sleep, or extreme nervous exhaustion, obesity, rheumatic diathesis, unhealthy or inactive skin, profuse perspiration when accompanied by a state of fatigue, extreme nervous irritability, a very low temperature of the skin, an immediately preceding or impending chill, and extreme aversion to cold applications.

The average temperature of the human nude skin is in the neighborhood of 90° F. The difference between the temperature of the skin and water is the chief element in determining the reaction of the individual. It is evident that water at a temperature of 90° F. would be neutral or indifferent; the difference of intensity of effect is in proportion to the difference of temperature of the water and skin. The duration of the cold procedure is an important element in the production of reaction. It may be laid down as a rule never to give any cold-water application without friction. The physical and psychic state of the individual exerts more or less influence upon his reactive capacity. An anemic, or otherwise depressed individual must be managed with great circumspection, because she bears heat abstraction badly. The hydriatic procedure must always be adapted to the reactive capacity of t[illegible] bather.

The woman must be thoroughly rubbed after the bath until a good reaction has occurred. Especial attention must be paid to the feet and legs. The bather should first be rubbed with a warm towel or sheet, and then with the bare hands of the attendant, as the warm hand greatly facilitates the reaction. The bather is by no means dry when the skin ceases to feel wet. So long as the skin is soft and spongy, it still contains moisture which has been absorbed by the superficial layers of the epidermis. The absorbed moisture, being left to evaporate after the bath, the individual is liable to become chilly and contract a cold, which is erroneously attributed to the bath itself.

Other injurious effects following imperfect reaction after the cold bath are secondary chills or a continuous chill lasting for several hours. The hands and feet are cold, there is headache, not infrequently diarrhea, and other evidences of internal congestion, such as abdominal or ovarian pain, vertigo, etc.

Reaction may be favored by covering the patient with blankets, surrounding her with hot-water bottles, and giving her hot tea to drink. Exercise should follow the bath. Walking for from twenty minutes to an hour is the most usual form of exercise. Very vigorous exercise for a short time cannot be substituted for moderate exercise for a longer time.

The Tonic Effect of Cold Upon the System.—The effect of cold upon the muscles, when given in the form of a cold bath, douche, or spray, is to augment muscular energy and tone to a very great extent; this increased muscular tonicity is the cause of the slight shivering. The cold douche, if short,—one or two seconds,—and given with a pressure of from 25 to 30 pounds, is a powerful restorative in fatigue resulting from severe muscular effort, but it must be immediately preceded by a short hot bath, and must be followed by vigorous rubbing and wrapping in a hot blanket.

Short cold applications cause elevation of temperature and increased metabolism, while prolonged cold applica-

tions cause a fall of temperature and decrease of metabolism.

The tonic effect of cold water is believed to be due to the stimulation of the sympathetic nerve-centers. The sympathetic nervous system controls the blood-vessels, heart, the functions of secretion and excretion; and, indeed, all the vital functions of the body.

The sensation of well-being which accompanies the reaction following a general cold application is largely due to an increased activity of the cerebral circulation. Cold water is a physiologic tonic, and the cold bath, properly employed, increases the vital resistance to pathologic processes.

All applications of water at a temperature low enough to provoke vital resistance are tonic; hence, tonic effects are produced by all temperatures below 90° F., but the most certain and pronounced results are obtained from the douche in every form, which adds mechanical impact to the thermic effects of cold. The most durable tonic effects are produced by the frequent use of very cold and very short baths.

A tepid bath causes a lowering of the body temperature.

The Chief Varieties of Baths.—These, in the order of frequency with which they are used, are: ablutions; tub; foot-tub; sitz; salt sponge; wet sheet; shower; Turkish; horizontal jet; needle; fan douche; Scotch douche; percussion douche; Roman and electric-light baths.

Ablutions or Sponge Baths.—These baths are of universal use. The sponge is one of the dirtiest and most impossible articles of the toilet to clean and to keep clean. It is a collector of dirt and germs, and should be banished from every bath-room and from every house. It is not sufficient that each member of the family should have her own sponge; it is quite possible for the individual to become infected or reinfected from her own sponge. Incidentally, it does not afford sufficient friction, and thus does not favor reaction. In taking ablutions, the application of water may be made with the hand, though it

is best made by means of a wash towel. The good effects of the simple ablution will be greatly enhanced by the use of the hat tub, and this especially where there is no bath-tub in the house.

When the bath is taken for the purpose of cleanliness, the water should be warm or hot, and pure Castile soap is one of the best that can be used. If the skin is rough, a good sand soap will be more beneficial. The bath should be completed by dashing cold water over the body with the wash-towel.

The body must be quickly and thoroughly dried by means of a rough bath-towel. After this, the skin may be still further toned up by a good alcohol rub.

If the ablution is taken simply for the tonic effect, it is generally taken on rising in the morning, and the water used is cold. The ablution may be confined to the upper part of the body, that is, the chest and back; and consists in friction with a rough wash-towel, followed by dashing the water over the body; followed by brisk friction with a rough bath-towel. This procedure causes a marked stimulation of the heart and lungs, and is followed by a rise of temperature.

In winter all baths must be taken in a warm room.

There is a decided increase of muscular and mental capacity after the cold ablution, demonstrating the tonic effect it has produced.

The cold ablution may also serve as an introductory to other and more heroic hydriatic procedures. If the reaction is not good, water at a higher temperature should be used, and only small portions of the body should be attacked each day, followed always by brisk friction. As the reaction becomes better, the temperature of the water should be gradually lowered from day to day.

There must be a decided sensation of warmth of the body before proceeding to take any form of cold bath. This may be induced by sipping a cupful of hot water before rising, and then being well covered with the bed-clothes until the body is in a glow. In conditions of

anemia or neurasthenia, where the circulation is markedly poor, in addition to drinking the hot water, the bather may stand on hot blankets while taking the cold ablution, and after it be rubbed briskly with hot towels.

Nothing is gained, and a great deal of harm is done, by trying to persevere in the daily cold ablution when it is followed by a pallor of the skin, chilliness, etc.

The Tub Bath.—This is much more refreshing, more salutary, and may be used to produce a much greater variety of effects than the simple ablution. Tub baths may be classified according to the amount of water in the tub as half or full tubs; and again, according to the temperature of the water, as warm, tepid, hot, and cold. The half tub contains about 30 gallons of water.

In a general way it may be said that the half tub of warm water is used for the purpose of cleanliness; the hot baths for breaking up colds, for rheumatism, etc.; the tepid bath to allay nervousness; and the full cold tub, for the tonic morning dip.

For cleansing purposes the so-called half tub, that is, the tub contains a sufficient amount of water to reach above the pelvis when one is seated in the tub, is used. The temperature ranges from 98° to 102° F. Five minutes is as long as the bather should remain in the tub, as all hot baths are more or less exhausting. After an initial immersion in the water, the scrub takes place by means of the Turkish bath-towel, or, better, by the use of the flesh brush. If there is a shower attached, the hot bath should always be followed by a brief cold shower; if not, the cold water should be turned on and dashed over the body by means of the wash-towel. This closes up the pores of the skin, prevents the profuse perspiration from taking place that so often follows a hot bath, and greatly diminishes the susceptibility to taking cold. An alcohol rub completes the procedure. This insures a further toning up of the cutaneous vessels. A small quantity of alcohol is poured into the hand and applied to a limited area of the body. It is well rubbed in with friction until

the alcohol has wholly evaporated. Beginning with the arms, the legs, chest, and back are successively gone over.

The hot bath is best taken immediately before retiring, and should not be repeated oftener than twice a week. Retiring to bed at once, the bed acts as the cooling chamber of the Turkish bath. The hot bath is most restful, and, except in rare cases, tends to the production of refreshing sleep.

If the bather has a weak heart, suffers from shortness of breath, or is weak from any cause whatever, she should only take a half tub bath, since it has been learned from experience that when the water covers the entire body, there is increased difficulty in the respiration, and the heart's action often becomes embarrassed, palpitation of the heart is experienced, with a feeling of impending suffocation. There is sometimes also a feeling of faintness. On getting into the tub, the temperature of the room should never be above 68° to 70° F.

The Full Tub or Immersion Bath.—In this form of bath there is a complete submersion of the body in the water, so that the water reaches the under surface of the chin, the head of the bather resting on a cross strap, being the only portion of the body uncovered by the water.

If the bath is tepid, that is, has a temperature of from 80° to 90° F., great care should be taken to have the chest covered, in order to prevent pulmonary congestion. This is best accomplished by placing a Turkish towel, wrung out of hot water, about the chest and shoulders of the bather just after she enters the tub.

If the bath is hot, from 98° to 104° F., before entering the bath the face and neck are rubbed with cold water, in order to relax the vessels of the brain and so prevent cerebral anemia. Except when the hot bath is given for especial therapeutic purposes, as for rheumatism, cystitis, colic, etc., it should always be followed by a cold application.

The Cold Dip.—For the dip, the tub is filled with water at a temperature of from 65° to 55° F. The dura-

tion of the dip varies from two or four seconds to one or two minutes. The bather should wet the face and chest before entering the water. It is best to enter the bath suddenly, as the sensation of cold is thus far less noticeable than when the bath is entered gradually. If the stay in the tub is more than momentary, vigorous rubbing must be kept up during the entire time spent in the tub.

For persons in good health a cold dip on rising in the morning is excellent. It creates an appetite, accelerates the circulation, arouses the nervous system, and produces decided exhilarating effects in those who are strong enough to react after it. When employed for this purpose, the immersion should not be more than from three to fifteen seconds. The bather must rub herself vigorously while in the tub, and follow the bath with brisk toweling and plenty of friction. She should then take moderately active exercise for fifteen to twenty minutes.

For any one just beginning to take the cold dips, the temperature of the water should be just 1 degree below that of the body, and gradually lowered by a drop of 1 degree every morning or two. Or, the dip may be preceded by a preliminary warm bath or warm shower.

The salient point in connection with bathing is not to allow the skin to lose heat too rapidly. To apply this as a warning in the case of cold baths: it has been estimated that the heat loss from the body immersed in cold water at the temperature of 86° F. is double the normal; at 77° F., three times, and at 68° F., five times, the normal.

The daily use of the cold dip for those who are able to react after it is one of the best means of fortifying the system against both acute and chronic diseases.

Contraindications.—The use of the cold dip is contraindicated for young children, the aged, and in run-down conditions of the system; in all cases where the action of the heart is weak, in Bright's disease, or in any acute or chronic congestion of the kidneys; in all acute inflammations, as inflammation of the bowels, peritonitis, or inflammation of the uterus and ovaries.

e **Baths.**—For these baths from 4 to 12 ounces bonate of soda should be used to 30 gallons of he water should have a temperature of from ° F. This bath is useful in many forms of skin d relieves the itching of jaundice and urticaria.

Baths.—The typical saline bath is the salt-h. Sea-water contains in solution from $\frac{1}{3}$ to f solids to the gallon of water. The principal s are common salt, magnesium chlorid, and n sulphate. These substances have a decidedly g effect upon the skin and encourage reaction. tificial sea-water bath, 8 pounds of sea-salt used to 30 gallons of water.

y coarse salt is purer, contains from 97 to 98 of the chlorid of sodium, is cleaner, and makes solution, and it dissolves in about one-third of equired for sea salt, and can be obtained for -third of the cost.

eansing agent, a 5 per cent. brine is equal or o soap. Further, the axilla and hairy parts

should be placed over the chest, in order to protect the precordial region from the impact of the water.

The cold shower should be preceded by some kind of a heating process—either a hot plunge or a hot shower bath. A shower of from 100° to 104° F. may be applied for one to three minutes before the cold application. A cool shower of 75° to 65° F. is an excellent training for persons who are sensitive to cold. The neutral shower, 92° to 97° F., given for three to five minutes, is sedative in its effects.

The cold shower, 60° to 70° F., duration from five to thirty seconds, is useful in phlegmatic neurasthenics and dyspeptics; sedentary people in whom the general metabolic activity is diminished; also in obesity and in all cases after a sweating process. By standing in hot water the bather is much more tolerant of cold.

The neutral shower is one of the most effective measures for the relief of insomnia; especial attention should be given to the back and legs. The action is quicker than that of the neutral immersion bath.

As a hygienic measure, the shower bath offers a most agreeable and rapid means of cleansing the whole surface of the body.

Since the effect of the douche depends on the pressure, it will be readily understood that the hose attached to the faucet of the domestic bath-tub is merely a sprinkler, and not a douche, in the proper sense of the word. Such a procedure can only be tolerated by the most robust. In the upper stories of most city houses the pressure is probably not more than from 3 to 10 pounds; the stream of water from the sprinkler is really only a drizzle; the mechanical effects being so slight, there is no reaction produced; the result is that its use is followed by a feeling of chilliness and depression.

The Hot Foot-bath.—The temperature of this bath should be at the beginning from 102° to 104° F., and the duration from three minutes to half an hour. The pail is nearly filled with water, care being taken that it shall

the blood-vessels of the feet and legs relieve
the brain and the organs of the upper hal
as well as of the pelvic viscera. It should b
diately before retiring.

The Sitz Bath.—The sitz or hip bath i
made for that particular purpose. The ba

Fig. 2.—Sitz-bath tub made of tin (Ashto

ich is most commonly made of tin, is cut hi
nt must be sufficiently low for the patient
tably in it, without undue pressure being
der side of the knees.

in case of sickness, as well-authenticated cases of paralysis are recorded in which the temperature sense of the patient was lost, and, in adding hot water, it was raised to such a temperature that the legs and feet of the patient were scalded.

During the sitz bath the patient keeps on her stockings and bedroom slippers, and, unless friction is ordered, the entire body, as well as the feet and legs, are enveloped in blankets.

The duration of this bath is from three to ten minutes. This bath is especially useful in restoring the menstrual function when it has been suspended as the result of chill or other causes; also, for relieving hemorrhoids, uterine colic, neuralgia of the ovaries, and inflammation of the bladder.

To prolong the effect of the bath the patient may be put to bed wrapped up in her blankets. In cold weather it is a good precautionary measure to have the bed heated with hot-water bottles, in order to prevent chilling.

Technic of the Wet Sheet.—The temperature of the room should be not less than 70° F.; having taken a glass of hot water as a preliminary procedure, the patient stands on a warm blanket. A linen sheet of coarse texture is very loosely wrung out of water at a temperature of 80° F., reduced daily until it reaches 70° to 65° F. The sheet is applied under the right axilla of the patient; pressing the sheet firmly to her with her right arm, the patient turns around, and the attendant draws the sheet snugly around her. When the entire body is covered, the upper border of the sheet is tucked in around the neck and the lower border around the legs. The attendant now makes rapid passes over the sheet, up and down the back, sides, and lower extremities, with outstretched hands, occasionally slapping the surface to increase the mechanical irritation. The duration of the procedure varies with the object in view. After the rub, the sheet is dropped and the patient enveloped in a hot sheet, with which she is rapidly dried, and she herself is given hot

towels to aid in the process. If the reaction is not good, friction may be given with the bare hand or with a hair glove.

This cold rub is generally given in the morning on rising, while the patient is still warm from the bed.

It should be followed by a cup of hot milk. The patient makes her toilet, has breakfast, and should then go out-of-doors for a brisk walk.

The indications for the use of this procedure are anemia of feeble persons, and neurasthenia and digestive disturbances in the same class of patients.

Wet Hand Rubbing.—If the patient is too feeble to be out of bed, very similar results can be obtained by this method. The bed must be protected by means of a rubber sheet, over which the muslin sheet is spread. A dry towel protects the hair and ears. The attendant stands facing the patient, dips both hands into the water, then applies them, one to each side of the patient's face, covering as large an area as possible. Friction is made from the median line outward, the tips of the fingers sweeping over the brow, and describing a sort of semicircle along the cheeks to the under side of the jaw. This movement is repeated from three to six times.

Next, the application is made to the chest; both hands are employed. First the upper part and then the sides are rubbed vigorously, then the abdominal surface. After the entire chest has been gone over three or four times, with quick short movements of considerable pressure, the towel is thrown over the chest and it is dried rapidly. The rubbing is continued until the surface is reddened. The face is not to be dried until the end, as it is desirable that these parts should be cooled by evaporation.

The object of making the application to the chest before proceeding to the other parts of the body is to stimulate the action of the heart and lungs, thereby promoting reaction.

The arms next receive attention—first one, and then the other. The attendant grasps the patient's hand with her

left, while with the other she vigorously rubs the arm with long strokes, from the wrist to the shoulder, her hand being kept wet and cold by dipping in the basin after every three to six strokes.

On finishing the arm, the attendant rubs the hand between her own, and ends with one or two smart blows upon the palm with the flat of the hand. The arm is then enveloped and thoroughly rubbed with a rough towel until well reddened. It is then covered with the blanket, and the other arm is treated in the same way.

Attention is next given to the abdomen. Friction is applied first transversely, the rubbing being done alternately with the two hands, then in a circular manner, following the course of the colon. The thighs, legs, and feet are then treated, one only being uncovered at a time.

The patient then turns upon the face, with the arms folded beneath the forehead, so as to draw the shoulder-blades upward and outward and to flatten the surface of the back as much as possible. The attendant then applies the hands, first to the back and sides of the neck, extending the fingers so as to reach around to the front of the neck. The upper part of the back, the shoulders, the middle and lower parts, and the sides of the trunk, lastly, the whole length of the spine, are treated by a few vigorous strokes. As quickly as a part is dried it should be covered.

Not more than five to ten seconds should be given to the rubbing of any part with the wet hand before the application of the towel. If the rubbing is insufficient to produce reddening of the part, light percussion should be made use of after drying. Good reaction should be procured in each area before proceeding to another part, and the skin must be warm at the time of the treatment.

The temperature of the room should be not less than 70° F., and that of the water 85° F., gradually decreased by one degree each day until 70° F. is reached. The hand of the attendant is made wet without dripping.

The feeble neurasthenic patient experiences after the

cold rub a delightful sensation of increased vigor and relief from malaise and nervousness. The warmth of the hand of the attendant, the rubbing, and the small amount of water used all tend to promote reaction, so that it may be said that there is no patient too feeble for this procedure.

The Salt Glow.—For this the ordinary cooking-salt is about the right degree of coarseness. The salt is slightly moistened, and is applied to the surface of the body with friction movements, the amount of reaction being adjusted to the patient's sensation. With very thin-skinned patients abrasion and irritation of the skin may easily be produced. In that case it is necessary, instead of applying the salt directly to the skin, to make a saturated solution of salt in water, and apply it in the same way that the cold rub is given.

After the application, the salt which adheres to the skin may be removed by the shower or spray. In feeble patients a dash of warm water should be given before a final dash of cold water.

The salt glow is a tonic measure of high value, especially in feeble persons whose heat-producing capacity is small. Its use must be avoided in eczema and all other forms of skin disease.

Salt Ablution.—As the name indicates, this is a salt-water bath, and the best results are obtained by using a saturated solution, which is in the proportion of 1 pint of salt to 1 gallon of water. Sea-salt is the best, but, if that cannot be obtained, ordinary salt may be used.

If there is no bath-tub in the house an ordinary wash-bowl may be used, but the bath is most effective when taken in the tub. The salt and water are put in a papier-mâché pail, which is placed at the foot of the tub. The chilliness which might be caused by sitting on the cold porcelain is avoided by placing a heavy folded bath-towel on the bottom of the tub. In cold weather the tub should be previously heated by allowing the hot water to run in.

The salt water feels very much colder than plain water at the same temperature. It is well to begin with a temperature of from 90° to 85° F., and gradually lower the temperature until 70° F. is reached.

The water is applied by means of a Turkish wash-towel, accompanied by vigorous friction, beginning with the face and neck, arms, legs, back, and, lastly, the chest and abdomen are gone over. After that, the water is dashed over the entire body, and is followed by a brisk toweling and friction with the hands or hair glove. The salt water should not be washed off, except in those rare cases where it causes a disagreeable sensation; it is then removed by the use of the hot followed by the cold shower, as previously directed.

Indications for Its Use.—It is an excellent nerve tonic in cases of depression with loss of appetite, insomnia, etc., also in anemia and neurasthenia. In this class of cases it is best taken in the afternoon, on rising from the siesta, and just before dressing for dinner. It is especially refreshing in the hot weather.

Its use is contraindicated under the same conditions that other cold baths are, and must never be taken when the bather has a tendency to chilliness.

The various kinds of baths previously described can all be obtained in the home, but the Turkish bath, with its various accessories, can only be taken in a properly equipped bathing establishment.

The Turkish Bath.—This form of bath dates back to the time of the Romans. The essential features of a modern establishment are: dressing-rooms; a warm room, with a temperature of from 110° to 130° F.; a hot room, temperature of 150° to 170° F.; a steam room; a shampoo room; a douche apparatus; a plunge bath, and a cooling room. In many establishments there is only one hot, dry-air room. The air of the room may be heated by steam-coils.

The bather, having disrobed, is enveloped in a sheet, and enters the hot room, where she reclines on a steamer-

chair. A towel wrung out of cold water is placed on the forehead and changed as often as it becomes hot. The bather should drink a glass of cold water immediately before or on entering the hot room, and several glasses should be taken at intervals during her stay in this room.

The skin is highly stimulated and profuse perspiration results. The profuse sweating promotes absorption from the alimentary canal, and so is a powerful stimulant to nutrition. It also emphasizes the necessity for copious water-drinking.

Great harm often results from a too prolonged stay in this room. Ordinarily, the bather should leave the room as soon as free perspiration is established; that is, in from fifteen minutes to half an hour.

From this room the bather next enters the Russian bath or steam room. It is very much more agreeable to have very little steam in the room on entering; when the steam is very dense, a feeling of suffocation may occur. Any one with a weak heart should avoid the steam room altogether, as it is apt to cause a sense of great oppression. For the complexion, bronchitis, or laryngitis, it is excellent.

From the hot room the bather goes to the shampoo-room, where, lying upon a marble slab, she is first gone over from head to feet by the wet hands of the attendant. This manipulation removes the layer of cuticle which has been loosened by the free perspiration. These rubbings and strokings are continued until the skin feels smooth and polished.

The bather is next shampooed with soap and water, applied with a bath-brush. This may in turn be followed by a salt rub. After this comes a douche, given with a horizontal jet, at a temperature of 104° to 106° F., followed by a cold douche.

If the bather is a strong woman, she may now enter the cold plunge. The temperature of this should be from 70° to 60° F.; this must only be a quick dip. She is then vigorously rubbed and dried. After this she lies down in the cooling room and has an alcohol rub, which completes

the procedure. She should rest here for half an hour at least before dressing. The pulse should be normal and the skin perfectly dry before she dresses and goes out on the street.

In winter, instead of the ordinary alcohol rub which is given, it is much better to have a thorough massage with cocoa-butter or almond oil—the so-called Roman bath. Just following the Turkish bath much of this oil will be absorbed, which is beneficial for thin people, and, in any case, it will lessen the danger of getting chilled on going out into the cold air.

The woman unaccustomed to these baths should under no circumstances go to a Turkish bath without consulting her physician, as great harm might result. The bath should not be taken oftener than twice a week, unless by special orders of the physician. Care must be taken not to overuse them, as frequent and prolonged exposures to the sedative influence of heat is very debilitating. The wise woman will provide her own bathing cap, bath-brush, and straw sandals.

The use of the Turkish bath is indicated in rheumatism, toxemia, chronic dyspepsia, biliousness, obesity, sciatica, and lumbago.

The contraindications to its use are, in Bright's disease of the kidneys, in most pulmonary affections, in the advanced stages of arteriosclerosis, and in diabetes with emaciation.

The Electric-light Bath.—This is now frequently used instead of the hot-air room of the Turkish bath, and possesses many advantages. A cabinet is lined on three sides with mirrors, on which are arranged 50 or 60 electric-light bulbs; the mirrors multiply the number of lights by reflection. A stool is placed in the cabinet for the patient to sit on, while the head protrudes above the top, which is closed. By means of switches and a proper grouping of the lamps in wiring, the number of lights, and so the temperature, can be instantly and perfectly controlled. The heat is derived by radiation, so that it is

not necessary to have the air confined. In this form of light bath the body is directly exposed to the effects of radiant light and heat.

The incandescent electric-light bath is superior to every other form of heating procedure in which the only object is the preparation for the cold bath. The time required is not more than from three to five minutes. When it is desired to produce profuse perspiration, the patient may remain in from eight to fifteen minutes. A longer stay than this is apt to produce an overstimulation of the nervous system and an excessive elevation of temperature.

The electric-light bath possesses the distinct advantages that, while the body is exposed to a high degree of heat, the air of the room in which the head is, and which one is breathing, may be cool, and unique advantages in the exactness of the dosage as regards time and intensity. It can also be used in a much greater number of diseases than the hot-air room of the Turkish bath.

The finishing treatment on leaving the cabinet is identically the same as that for the ordinary Turkish bath.

Indications for Its Use.—While the electric-light bath is not a complete substitute for sweating produced by exercise, it comes nearer to that than any other heating procedure, and, when followed by some vigorous cold application, it possesses a hygienic value which cannot be overestimated.

It is especially valuable in cardiac disease and diabetes. It stimulates oxidation, and is thus valuable in obesity and the toxemia of chronic dyspepsia; also in malarial cachexia, syphilis, neuritis, neuralgia, sciatica, habit chorea, hysteria, rheumatism, and anemia.

It is superior to all other treatment in chronic rheumatism and all diseases dependent on uric-acid diathesis or diminished metabolism, by the combined action of the elevation of temperature and the vigorous cutaneous activity. The elevated temperature stimulates the oxidation of the proteid wastes and augments vital combustion,

while the increased skin activity carries off all waste-products prepared for elimination.

As a prophylactic, this form of bath is especially valuable for all persons leading a sedentary life; it is the best substitute for exercise in the open air, and, where there are no contraindications to its use, should be taken once a week.

In cases of obesity, sweating may be used to reduce the weight; but, in order to obtain the best effects, it must be combined with exercise, and it must be borne in mind, that in obesity there is great danger of overheating the blood, in consequence of the obstacles to heat elimination presented by the thick layers of non-conducting fat. Therefore, these hot applications for the reduction of fat should never be too much prolonged, and the bath should always be finished by vigorous applications of cold. These cold applications have also a tonic effect upon the nervous system, and increase the muscular disposition for exercise, and this is the most rational treatment for obesity.

Loss of Weight.—There are many cases in which metabolism has been so sluggish, allowing an accumulation of imperfectly oxidized matters in the body, that the first active stimulation of the nutritive processes is in disproportion to the increased destructive metabolism. Under these circumstances there is necessarily a decrease in weight. The rubbish must first be removed and old defective structures before new and highly organized tissues can be deposited. A slight loss of weight need, therefore, give rise to no apprehension, but if the loss is considerable, or continues for some time, especially if accompanied by loss of strength or appetite, it is a matter for investigation.

Palpitation of the heart and fulness of the head are an indication that the applications have been too hot or too long continued. Vertigo and fainting are apt to occur when hot applications have been continued too long, but they are quickly relieved by cold applications, especially by cold affusions to the chest and shoulders. Headache

may result, either from excessively hot or cold procedures. Deficient reaction is generally the result of a too prolonged application of cold.

On entering the electric-light cabinet, a wet towel wrung out of ice-water is placed around the neck and another around the forehead; or an ice-bag may be placed on the top of the head.

The Douche.—A douche consists of a single or multiple column of water directed against some portion of the body. The apparatus is complicated, and it is essential that an accurate pressure-gauge and thermometer should be introduced into the circuit of the douche. It can only be properly administered in a hydriatic establishment. In the employment of the douche three factors must be considered—the temperature, pressure, and the mass.

The range of temperature employed varies from 45° to 125° F. The pressure ordinarily employed varies from 10 to 60 pounds. The mass varies according to the effect desired, and may be regulated by means of the finger, placed in the water column near the nozzle.

The douche is applied by means of the rubber hose, which is connected at its proximal end with the water-supply, and at its distal end is attached a nozzle, the average diameter of which varies from 2 inches to $\frac{3}{8}$ inch. From these a fine or coarse jet or a fan douche may be produced. The latter is formed by placing the index-finger of the hand holding the nozzle upon the lower border of the outlet, producing an expansion of the otherwise solid jet into a fan-shaped stream.

The mechanical effects of the douche are derived from atmospheric pressure, and this is of more importance in the effects produced than the temperature.

The Scotch douche consists of alternate streams of hot and cold water. The general cold douche is the most powerful of all the tonics; the warm or neutral douche is sedative; the very hot douche is frequently followed by atonic reactions.

The Percussion Douche.—This is the form of douche

most frequently used in the hydriatic establishments of France. In this there is a combination of air and water, in such a manner that the column of water is broken up into a number of short columns, and projected upon the surface of the skin with any desired amount of force. The impression produced upon the skin may be compared to a stream of lead bullets from a Gatling gun, and is accompanied by a strong tingling of the skin.

Not only are the blood-vessels of the skin made to contract, but the force of the impact compresses the tissues and forces the blood out of the vessels, leaving them free to dilate again as soon as the pressure is removed. Thus the tissues are alternately compressed and released; in other words, a veritable massage is produced, whereby the circulation is excited and accelerated and the thermic effects of the douche materially aided by the purely mechanical or percussion effects of the moving water, as really as if friction or percussion had been effected by the hand.

Under the influence of this douche, and the only other one comparable in its good effects, is the Scotch douche; the whole organism is aroused to the highest degree of activity, the vital resistance is increased, the digestive activity is augmented, oxidation and elimination are increased; all the wheels of life move with quickened vigor, and the individual lives on a higher plane, physically, mentally, and morally.

Application of the Douche.—Since in France the most careful scientific study has been made of all hydriatic procedures, and all the establishments there are under the direction of physicians, the douche will be described as given there.

No patient at any of the cures there is allowed to drink the water or undertake any form of hydriatic procedure without first being carefully examined by one of the staff of physicians belonging to the "cure." After this examination a carefully written formula is given the patient for the instruction of the attendant, just as a prescription

would be written for the druggist. On this card is written the temperature of the douche, the duration, and the number of pounds pressure to be given.

The halls and dressing-rooms of these establishments are kept much cooler than in this country, so that a heavy dressing gown is needed to go from the dressing-room to the bath. Straw sandals are provided, which are removed on entering the douche room. The hair is kept dry by means of a rubber cap, which should be pulled down well over the ears.

The bather is first directed to wash her face, then the jet is applied first to the back for a few seconds, then the legs and arms, then the anterior part of the body and the liver, ending with a strong dash on the feet. The entire body is gone over in this way several times, the patient turning around as directed by the attendant. The patient stands while taking the douche; if she is feeble, rails are provided to lean against.

In the application of the douche it must be remembered that the stream of water must not be allowed to fall steadily upon one spot, but, by constant movements of the nozzle and the body of the patient, the stream should be directed upon different portions of the body in a succession of dashes.

The hot douche is most frequently used as a preparation for the cold one. The cold douche is never given without some sort of heating process as a preparation. The duration of the cold douche is from three to four seconds. The temperature of the cold douche is from 45° to 65° F.; the cool douche is from 65° to 80° F.; the tepid douche, 80° to 92° F.; the neutral douche, 95° to 97° F.; and the hot douche, from 104° to 125° F.

A good working douche is between 55° and 70° F. The higher the temperature, the longer must be the duration and the greater the pressure required to produce the tonic effects.

The neutral douche should be given with a pressure of from 5 to 20 pounds, and a duration of from three to fifteen

minutes; but, if a sedative effect is desired, the pressure should not exceed 10 pounds.

After the douche the patient is enveloped in a hot sheet, over which the bath-robe is thrown, the sandals are again put on, and the patient returns to her dressing-room, where she is vigorously rubbed down by the attendant through the sheet, the patient herself assisting in the drying process by the use of hot towels. After this, the attendant goes over the entire body with her hand covered by a coarse hair glove, and very many pounds pressure, until the whole body is in a glow. If the reaction is not as prompt as should be, the attendant uses her bare hand.

This douche should not be taken sooner than two hours after meals. The best time of day is about 10 o'clock in the morning or 3 in the afternoon.

Rationale of the Douche.—The douche is a thermic massage. Since the douche is a sorbefacient of pathologic products, the French have availed themselves of its use to aid the body to throw off an excess of uric acid, fatigue toxins, etc.

It has been demonstrated that a rain douche of 50° F., under a pressure of two atmospheres, increases threefold the work that the muscles are capable of doing, while the Scotch douche, oscillating between 98° and 53° F., doubles the working capacity of the muscles. Even tepid douches increase the working capacity of the muscles, while a tub-bath of the same temperature is without decided effect. The pressure under which the douche is given adds a powerful element, which is absent in other hydriatic procedures. The percussion and vibration affect the vasomotor system much more powerfully than any form of still bathing.

The power and action of the heart are greatly improved by the use of the douche, the capacity of the lungs is increased, and the digestion is improved.

Brief douches of from ten to fifteen seconds generally act better than those of longer duration. The general

condition of the patient must always be carefully studied, and, like the Turkish bath, the douche should always be taken under the direction of a physician, as they are also capable of doing a great amount of harm as well as good. The best results from the douche are obtained when it is taken following the use of the electric-light bath.

The neutral douche is particularly applicable in cardiac affections and in cases of high arterial tension. The sensation afforded should not be either that of hot or cold, and the duration from one to two minutes. The douche for this purpose should be given with only a slight degree of pressure, and to avoid irritation it should be directed to either side of the spinal column. This is a sedative application.

Contraindications for the Use of the Douche.—In all acute inflammations and in eruptive disorders of the skin. The cold douche is contraindicated in inflammation of the uterus, ovaries, kidneys, stomach, liver, bowels, and bladder, in intestinal catarrh, chronic inflammation of the stomach, and general neuritis. It must also be avoided in rheumatism, arteriosclerosis, cardiac insufficiency, valvular diseases of the heart with deficient compensation, fatty degeneration of the heart, and in cases of extreme nervous irritability.

The Internal Use of Water.—The internal use of water is essential to life. Water constitutes about two-thirds of the body weight; it is found in every tissue and organ of the body; it acts to dilute the foods so that they can be absorbed from the digestive tract; its presence in the blood is essential, both to carry foods to the tissues and to convey the waste matter away from the tissues. Its use in the form of a lavage is even more necessary, to keep clean and free from impurities the mucous membrane lining the 30 feet of the digestive canal and the tubules of the kidneys than is the external use of water to keep the skin in a healthy condition. Its use is also needed to keep the blood-pressure and the heart in a normal condition.

About $4\frac{1}{2}$ pints of water are given off daily in the excreta and exhalations; but, since about one-half of the solid foods taken consist of water, 3 pints of water, taken daily as such, are sufficient to counterbalance the loss.

All water for drinking purposes should be filtered. The best method is to have a filter attached to the pipes of the house-supply, so as to insure filtered water running from all the spigots.

If the water is not filtered, it should be boiled for thirty minutes. The water should be run off in the morning, then poured into a well-kept tea-kettle and boiled. It is then allowed to stand and become partially cooled in covered vessels, when it is poured into large bottles—quarts are the most convenient size; these should be stoppered with corks of absorbent cotton. When cool, the bottles are placed in the refrigerator beside the ice. Water should be boiled every morning for the twenty-four hours. Boiling for this length of time secures the destruction of all the germs of disease, and it is doubly essential on the return to town in the fall, when the house has been closed for some time; also when typhoid fever in the neighborhood indicates the strong possibility of the impurity of the water-supply.

The mistake should not be made of undoing the good that has been done by boiling the water by the addition of ice to the water when it is placed on the table. Furthermore, ice-water is so cold that it retards and interferes with the digestive processes.

In the internal use of water the same marked difference is caused by the different temperatures at which the water is taken, as was seen in the external applications of water; but, while the temperature of the skin is about 90° F., that of the mucous membrane lining the digestive tract is 98.6° F. and above.

The Action of the Internal Use of Water on the Heart and Blood.—Water improves the quality of the blood, both by its direct action on the constituents and by the increased elimination of waste-products. By the increase of the

volume of blood, a more energetic contraction of the heart is caused, and the activity of all the glands of the body is increased. There is a greater amount of oxygen absorbed by the lungs; oxidation in the tissues is carried on more perfectly, the result of which is that there is a diminution or absence of the products of incomplete combustion in the body, such as uric acid, the oxalates, etc.

By the increase of the blood-pressure, caused by drinking water in sufficient quantities, the activity of the kidneys is increased, and this not only in the amount of urine passed, but also of the solid constituents, which are the waste-products, removed from the body through the agency of the kidneys.

The Action of Water on the Digestion.—Very little water is absorbed from the stomach; it passes from the stomach to the intestines, where it is absorbed. In order to obtain a thorough cleansing of the stomach, and at the same time not to cause its overdistention, not less than ½ pint of water and not more than 1½ pints should be taken at one time. The water must be taken one hour before meals, in order to insure its removal from the stomach and the proper rest of that organ before food enters it, as it has been found by actual experiment that in a quarter of an hour after water had been taken one-half of the quantity remained in the stomach, but that none remained after the lapse of half an hour. Cold water is more quickly absorbed than warm, and the absorption is hastened by the presence of carbonic acid, while salt of any kind delays its absorption.

The Therapeutic Indications for the Use of Water.—First, the temperature of the water taken must be regulated by the effect desired. Briefly stated, if the water is taken for dyspepsia in any form, whether acute or chronic catarrhal inflammation of the stomach or the intestinal canal, ½ pint of water, just as hot as it can be sipped with a spoon, should be taken three times a day, one hour before each meal.

No water should be taken during the meal, and only

one glass, at a temperature of about 60° F., on its completion.

If the water is taken as a diuretic, or, in other words, to increase the activity of the kidneys, the most of the water should be taken in the morning on rising and the remainder about 4 o'clock in the afternoon. Probably the best natural waters for this purpose are the waters of the Vosges, France. The Vittel water, "Grande Source," acts on the kidneys alone; where the bowels are regular or inclined to be loose, this is the best water to use. If, on the contrary, there is constipation or biliousness, the "Source Salée" should be taken in connection with the first named or alone. The "Source Salée" has a decided action on the liver and is laxative.

In order to obtain a pronounced effect, at least 3 pints of these waters should be taken daily; in some cases more is required. Two glasses may be taken on rising in the morning, with an interval of twenty minutes between; the last glass must be taken one hour before breakfast. The temperature of the water should be 50° F., which is the temperature of the water at the springs and that of the water when placed in bottles in the refrigerator against the ice. In the afternoon the other two glasses may be taken, with the same interval between.

In gastric catarrh, where there is an accumulation of mucus or fermenting matter, with or without nausea and vomiting, hot water alone is useful. In addition to its action in diluting the contents of the stomach and the intestines, and its cleansing and antiseptic effect on their mucous membranes, the reflex effect of very hot water, slowly sipped, is a stimulation of their muscular coats, which furthers the passage of the digested food from the stomach into the intestines. The quantity taken must be from ½ to 1 pint, in order to obtain a thorough cleansing and yet not to cause an overdistention of the stomach.

In acute nephritis, inflammation of the kidneys, small quantities of very cold water, repeated at half-hourly intervals, act as a diuretic. Care must be had, however,

not to overtax the stomach and heart by overfilling the system with fluids.

In obesity, water-drinking is essential as a means of dissolving and carrying out of the body the large amount of broken-down material which results from the increased tissue destruction caused by exercise, hot and cold baths, and other means employed to decrease the weight.

For constipation and biliousness two glasses of cold water should be taken before breakfast, with an interval of twenty minutes between, the last glass being taken one hour before breakfast.

Contraindications.—Cold water taken into the stomach produces more marked effects than water applied to an equal area of the skin. The quantity of water taken is a factor as well as the temperature. Cold-water drinking lowers the temperature and slows the pulse, so that drinking cold water must be strictly prohibited when one is in a state of fatigue, whether perspiring or not. Feeble persons should not drink cold water, except in very hot weather, or just before starting out for a brisk walk in the open air, or when about to engage in other exercise. With the air of the room at 70° F., a woman in fair condition, moving about making her toilet, may safely drink cold water slowly, except when there is a feeling of chilliness. In the latter case, the powers of reaction being diminished, chill and internal congestion, often resulting in great injury, may be produced. Cold-water drinking is always prohibited when in a state of fatigue. Ice-water should never be taken. When taken with meals, it greatly retards digestion and may do much harm.

The French Cures of the Vosges.—Six hours east from Paris, situated in the foot-hills of the Vosges mountains, at an elevation of from 1100 to 1200 feet, are three of the noted French cures—Vittel, Contrexéville, and Martigny-les-Bains. Their waters are very similar, those of Vittel being the mildest and those of Martigny-les-Bains the most powerful, but at all of them the drinking of the waters is the main thing, supplemented by hydriatic

procedures. Contrexéville is the oldest and best known; Martigny-les-Bains has the best natural location and is the newest. Vittel has the advantage of having first-class hotels and an ideal hydrotherapeutic establishment, equipped with all the modern contrivances for mechanotherapy and every known form of douche.

The manner of drinking the water is the same in all, the difference being in the quantity of water taken, which varies with its strength.

At all there are only two meals a day, breakfast being omitted; the "dejeuner a la fourchette," at ten or half after, corresponds to our luncheon, except that it is much heavier. Dinner is served at half after six.

On reaching the "Cure" the patient at once selects her physician, and places herself under his care during her stay. She is subjected to a most careful examination, and closely watched to ascertain the effects of the waters and other procedures ordered.

The drinking establishment is in the Park, and patients are expected to reach there at 7 o'clock in the morning. On the first morning of the cure only two glasses of water are taken; the size of the glass varies from ½ to 1 liter, according to the condition of the patient. The water is taken at the temperature at which it comes from the springs, namely, 50° F., as this is a much greater tonic to the digestive organs and the kidneys than warm water. The water is taken slowly, the patient moving about while drinking it. After this a brisk walk of twenty minutes through the park is ordered, when the patient returns to the pavillion for her next glass of water. The walk is then resumed, and great emphasis is laid on the rule not to eat anything for one hour after drinking the last glass of water. The reason for this is obvious. The water is given in such quantity as to cause a laxative action, the object being to secure a complete lavage of the gastro-intestinal tract when completely empty, so as not to interfere or carry off the products of digestion. Several watery stools are produced, the last one not being later than 10

o'clock in the morning; any stool after this hour is considered in the light of a diarrhea and is so treated.

At 4 o'clock in the afternoon another glass is taken.

On the second day three glasses are taken in the morning and two in the afternoon, always with an interval of twenty minutes between. On the third day four glasses are taken in the morning and two in the afternoon. This is the maximum quantity taken at Contrexéville, and this quantity of water is taken every day during the cure, except that at the last three days there is the same tapering off in the amount of water taken as was observed at the beginning. The time of the cure is three weeks.

At first the lack of the accustomed breakfast feels like a great hardship, and if the patient is not very vigorous, she is apt to feel exhausted; but, with the bracing morning air, the exhilaration of the brisk exercise, the lively music of a really excellent band, and the interest of the moving panorama, one soon becomes accustomed to the changed routine.

The elevation, the great purity of the air of these pine forests, the entire change of scene, and the freedom from care doubtless all contribute to the benefits effected by these cures, but the substantial and very salutary after-effects can only be attributed to the ridding of the body of a large amount of toxins, and to the greater activity of all the digestive processes and of the general body metabolism.

One's faith in the power of ozone and the benefits of early morning exercise in the open air becomes firmly fixed as she feels the cobwebs being swept out of her brain. The sensation produced is that of a current of fresh air passing through the brain itself. The accompanying feeling of well-being, caused by the increased activity of the circulation of the brain, is indescribably delightful.

On leaving the cure the patient is advised, on returning home, to drink the water one week out of every month—preferably the week following the menstrual period.

Enemas.—Coloclysters.—Another valuable internal use of water is for emptying the lower bowel, and washing out the large bowel in cases of catarrhal inflammation.

For constipation, in which the object is to unload the bowel as quickly as possible, 1 or 2 pints of water, at a temperature of from 104° to 110° F., is made into a suds by means of Castile or other good soap, and poured into a fountain-syringe. If the enema is being given by an attendant, the patient lies on the right side in the Sims' position; the under leg is stretched out so that it forms a straight line with the trunk, while the upper leg is sharply flexed at the knee, so that the foot is opposite the knee of the under leg; the right arm is thrown back from under the body.

If the patient is administering the enema to herself, the best position is the knee-chest. In this the patient kneels on the floor, the thighs are held rigid, and while the shoulders are brought to touch the floor, the face is turned to one side. The position can only be taken satisfactorily with the corsets and all tight bands around the waist removed. In this position gravity causes the intestines to fall upward toward the waist, and the water naturally follows this course. In this position the water goes up higher, and is retained longer, than when taken in the other positions. Two pints of the soap-suds are prepared at the proper temperature, and the patient uses as much of this as she feels that she can retain. The water should be retained from five to ten minutes, to get the best results.

For the purpose of washing out the large intestine more water is used, but not more than 2 quarts should be used for this. The position of the patient and the temperature of the water are the same. But for this clyster, instead of adding soap to the water, cooking salt is used, in the proportion of 1 teaspoonful of salt to 1 pint of water.

This lavage of the intestine removes rapidly large masses of decomposing material, swarming with microbes and ptomains and the toxins produced by them. It also increases the activity of the portal circulation.

In cases of chronic constipation there are atony and dilatation of the colon, and the patient always carries about with her an enormous accumulation of fecal matter, and lives in a state of chronic autointoxication. In this class of cases the coloclyster should be administered daily for from two to three weeks; if need be, so long as the patient complains of gaseous distention and fetid flatulence. After the discharge of the warm water, 1 pint of cool water should be introduced, beginning with a temperature of 85° F., and gradually decreasing this from day to day until 70° F. is reached. This water should be retained if possible; it acts as a tonic bath for the colon.

Care should be exercised to avoid the distention of the colon by an excessive amount of water, and, after the colon has been thoroughly cleansed, the amount of water used should be decreased from day to day, until finally only 1 pint is used. Warm water is always relaxing, whereas cold water stimulates and tones up the bowel. If the quantity of water used is small, the cold coloclyster may be used indefinitely without producing constipating effects.

Great care must be used to avoid the introduction of air into the bowel with the water; to this end the water is allowed to run out of the nozzle before its introduction into the rectum. A small-sized nozzle should always be used, and this should be lubricated with vaselin or some other emollient, in order to prevent irritation of the mucous membrane.

Vaginal Irrigations.—To be of any service the vaginal douche should be taken in the horizontal position. It may be taken on the bed, couch, or lying on the floor. When taken on the floor, a heavy rug or steamer blanket should be doubled four times, and two pillows are used: the under one goes up and down for the support of the back, while the second is used for the support of the head. A douche-pan is, of course, indispensable. The agate pans holding 4 quarts of water are the most serviceable. The douche-pan is placed against the lower edge of the under

pillow, which is protected by a bath-towel. The woman must throw a heavy shawl or blanket over herself while taking the douche, otherwise there is great danger of becoming chilled, and thus doing actual harm instead of good.

The most common and best form of syringe is the fountain-syringe. This is hung about 6 feet above the bed or floor. It should hold 4 quarts of water; this quantity of water is necessary when the douche is given, as it most commonly is, for pelvic inflammation. On beginning its use, the temperature of the water must be controlled by the sensitiveness of the patient; generally one can use a temperature of at least 112° F., but not always; sometimes one must be content with a beginning temperature as low as 104° F., gradually increasing the temperature by two degrees every few days, until from 114° to 120° F. is reached. The use of a bath thermometer is always essential to test the temperature of the water. The temperature of the douche should never go above 120° F., or actual harm will be done.

On lying down, the lower part of the body rests on the broad strip of the douche-pan, the nates coming over the edge, and the clothing well pushed up, otherwise the water will seep up the back.

The water acts as a hot poultice about the uterus and its adnexa; it is also astringent, and greatly relieves ovarian irritation and congestion. It is highly sedative, and is best used at night just before retiring. In severe cases better results will be obtained by its use twice daily. In that case one douche must be taken in the morning, but in cold weather it must never be taken immediately before going out-of-doors; there must be at least one hour between the time of taking the douche and going out into the cold air. Patients taking hot douches must be warned that the pelvic viscera are much more susceptible of chilling because of these heating procedures, and of the necessity to counteract this tendency by the wearing of woolen abdominal bands, both night and day.

y, plain hot water is all that is necessary if the vaginal discharge is irritating, one tea- borax may be added to the pint of water; or nful of cooking salt; or one-half teaspoonful ate of zinc.

g the Ear.—This procedure is made use of to acted ear-wax or to relieve the pain of earache. ntain syringe should be used, hung not more above the head. The water should have a of from 105° to 110° F. The nozzle must nd have a very fine opening, and great care ed in its introduction not to allow the nozzle yond the external opening of the ear. A pus- all dish may be used to protect the clothing g wet. After the procedure is finished, the by means of a very fine handkerchief or a ent cotton.

CHAPTER II

THE CARE OF THE SKIN AND ITS APPENDAGES

The Complexion; the Action of the Bath in Health; the Proper Time to Bathe; the Care of Wash-cloths; Cleansing the Face; Protection of the Face; the Use of So-called Cosmetics for the Face; Facial Blemishes, Freckles, Liver Spots, Sallow Complexion, Pimples, Acne, Eczema, Wrinkles, and Superfluous Hair and Their Treatment; the Relation of Diseases of the Skin to Internal Disorders.

The Hair; Dandruff; Causes and Treatment of Premature Thinness of the Hair and Baldness; the Care of the Hair; Gray Hair.

The Cosmetic Care and Treatment of the Hands; Cosmetic of the Nails; the Care of the Feet; Painful Affections of the Feet.

THE face is a complete index of the life of the individual written large, so that he who runs may read. By looking at the condition of the skin and the whites of the eyes we can judge very fairly of the digestion. From the dulness or brilliancy of the eyes we can make a very good diagnosis of the mental condition. From the general expression of the face we can read the kind of life that has been led by the individual, whether of pleasure, dissipation, or sorrow. From greatest antiquity men and women have striven to beautify their bodies. To be indifferent to the personal appearance is an indication of some abnormal condition in the individual or her environment.

The Complexion.—The skin of the face is known as the complexion, and this is the part of the skin that is most exposed to the vicissitudes of dust and grime of the streets or of the occupation, as well as to heat, cold, and winds.

An ideal complexion combines the qualities of clearness, translucency, and fineness of the outer skin, with a proper disposition of the blood-supply.

slucency of the skin may reach a point where an absolute defect, as is sometimes seen in sumption.

ss the skin becomes dull, opaque, and lusterless; ing health, its proper translucency and brilln.

ty of the skin is evidence of good respiration, ion, proper excretion by the bowels, skin, and od condition of the blood, and plenty of outse.

well known that the skin, as well as other parts , depends for its integrity upon the general tem. Disturbance anywhere in the body acts ntral nervous system. A simple case of indin manifests itself over considerable areas of the

be too earnestly impressed on the reader that entirely dependent on the health. It will een that no external applications can produce

PLATE I

Facial expression.

dust of all kinds, soot, particularly that from the clothing, and so forth.

Caustic soaps and borax in excess may remove the oil in so great quantities as to be detrimental to the skin.

Within twenty-four hours the skin, especially those parts which are covered, becomes vested with a pellicle of impurities, which, when allowed to remain, become thicker every day, and may produce injurious effects by obstructing the excretory openings and affording lodgement for disease. The effects would be felt not only in the skin, but in the whole organism. The skin when not cleansed will be irritated chemically and mechanically.

The Proper Time to Bathe.—This depends on the nature of the bath to be taken, the strength of the woman, the temperature of the room, and the season of the year.

To repeat, a cold bath of any description must never be taken unless the body has a decided sensation of warmth. In winter, if she will drink a glass of hot water before rising and has a warm room, the woman in average health may take a cold sponge bath. But the body must be very gradually trained to the application of cold, just as it is to vigorous muscular exercise. For the woman who has never in her life taken a cold bath of any sort, except in midsummer, to begin a heroic treatment with cold baths in winter would be utter folly, which might easily be the cause of pneumonia and even of death. The time to begin a systematic use of cold water is in summer, continued through the autumn, and by the time midwinter has arrived, the system has become so toned up that nothing but good can result.

If the woman is not very strong, she had better begin with the cold ablutions, just to the waist, on rising in the morning. These must always be followed by a vigorous toweling and friction. In case of inflammation of the kidneys or pelvic viscera, cold applications to the abdomen should be avoided, as they are badly borne.

If the woman is anemic, has a poor circulation, or is conscious of her heart, she will feel at her best in the after-

hat case, after a cup of hot bouillon, taken
m her siesta, she may take a quick hot scrub,
a cold shower. This is much more invigorat-
cold ablution, and the reaction at that time
more vigorous than in the early morning.
simple ablution, the next step in training
he cold wet sheet. It is impossible to take
an attendant, but a good maid may readily
o give the necessary rubbing. Ordinarily,
enough to attempt in one winter.
woman, who has always been accustomed to
baths, may all the year round, except just
g, and immediately after the menstrual period,
dip on rising in the morning. It must be
uick dip in a tubful of cold water, from 65°
, if she is sufficiently strong to stay in the tub
e must be a constant brisk friction kept up
water.
nitted only a woman in good health, with a

ease, and are the best preventives against ordinary colds and sore throat.

A hot tub-bath is best taken at night just before retiring. In winter it must never be taken immediately before going out-of-doors, because the pores of the skin are more or less open and there is great danger of chilling. A hot tub-bath, remaining in the bath for some minutes, should not be taken more than twice a week, as it is too debilitating, and a prolonged stay in the hot water causes an actual loss of flesh.

A woman may take a warm sponge bath in a warm room at any time of the month, but during the menstrual period she must, under no consideration, take a cold tub-bath or even a cold sponge-bath, since this would be apt to cause a chill of the surface of the body and a congestion, if not an actual inflammation, of the pelvic organs.

No bath should be taken within two hours after eating, as the bath draws the blood from the stomach toward the surface of the body and so interferes with digestion.

The Care of Wash-cloths.—After using each time, the wash-cloth must be thoroughly washed, well rinsed, and hung up to dry. But this is not sufficient: once every week all wash-cloths must be sent to the laundry to be boiled, thus insuring the destroying of any germs that may lurk in the cloth. If a woman has any kind of skin disease, it is quite possible for her to reinfect herself after the disease has apparently become cured. Further, each member of the family should have her own individual towels, soap, and wash-cloths. Aside from all sanitary questions, in a matter so intimate as the bath, there is something repulsive in the thought of having your toilet articles used by any one else.

A pure Castile soap is one of the best that can be used. All cheap scented soaps should be avoided, as they are apt to contain impure materials that will actually injure the skin. If the skin is rough, rubbing it with a good sand-soap, and rubbing the same on the flesh-brush, will remove many of the scales and leave the skin much

d softer. Medicated soaps should never be
by the direction of a physician.
the Face.—The face should be well washed
with cool or cold water, but the temperature
should not be below 60° F. The degree of
st be determined by the feelings and judg-
ndividual. If the face were washed with very
cold water, and then exposed to the cold air,
uld become rough and chapped. The water
oft. To soften hard water, put 1 pound of
nuslin bag, place in 4 quarts of water, and boil
inutes. Add enough of this bran water to the
e the water milky.
ven face towel, kept for the face and neck
be used with a moderate degree of friction.
nust be used to wipe the skin thoroughly dry.
estion whether the daily use of soap on the
able; for the healthy skin it is not essential
ove very injurious. Soap should never be
face in winter just before going out-of-doors,

aids in the nutrition of the skin; and, when applied to the neck with good massage, is a great protection against sore throat due to exposure to drafts and cold.

Protection of the Face.—The cold winds of winter cause a dryness of the uncovered skin of the face and lips, which often leads to a painful chapping, and, in the case of the lips, small fissures may be produced. In addition to the use of cold cream, a good rice powder may be applied, which serves as a further protection to the skin.

In very cold weather a veil should be worn to protect the face from the cold and winds. In summer a parasol should always be carried, to protect the eyes and brain as well as the face from the hot rays of the sun.

The Use of So-called Cosmetics for the Face.—All skin specialists, and these are in the very best position to judge of the great amount of harm that is done, say emphatically that the use of face lotions and "paints" can only work the lasting injury of the complexion. They may assist in hiding the defects of nature, but they frequently contribute to increase these defects. Many of them merely fill up the pores of the skin and give it a pasty look. Numerous cases of eczema and other diseases have followed the use of paints. Of the advertised cosmetics, many are not only worthless, but actually injurious.

Certain applications to the skin of the face are permissible and beneficial. "Virgin milk," which is a milky-looking mixture, composed of the tincture of benzoin and rose-water, renders the skin soft, and is said to prevent the formation of freckles. If the skin is dry, glycerin may be added to this. The formula for this mixture is as follows: Take of the tincture of benzoin and glycerin each 1 ounce, mix well, and then add 2 ounces of rose-water. This should be applied by the fingers, just after the face is washed. Pure glycerin is irritating, and should never be applied to the face without dilution.

The various good preparations of rice and talcum powder on the market are perfectly harmless, and, if there is a

greasiness or shininess of the skin, the use of ential from an esthetic point of view. In iness a little calcined magnesia may be used. her the use of face powder is very refreshing, ot climates it is used for this purpose to a very ent. But the true cosmetics, and the only procure and keep a beautiful complexion, are ercise in the open air, attention to the diet, evacuation of the bowels, to the condition of to baths, and to proper dress.

emishes.—Among the most common facial e freckles, liver spots, a sallow complexion, e, eczema, superfluous hairs, and wrinkles.

-These are brownish or yellowish pigmentary g from the size of a pin-head to that of a pea. on the face and the backs of the hands. t of a circumscribed deposit of pigment; known about their origin. The pigment is he deep layers of the epidermis, and, in order he freckles, it is necessary to use something

Pimples, or Blackheads, and Acne.—These are affections of youth, and are generally seen together, the last-named being simply a second stage of the first. Pimples, or blackheads, appear as small elevations in the skin, with a small black point in the center. The cause of the pimple is the alteration in the quality of the sebum, the oily secretion, which becomes and remains a hard mass in the excretory ducts of the sebaceous glands and plugs up its external opening. The dust of the air becomes mixed with the fat, and thus makes a black point. When the ducts cannot get rid of the sebum, they become stopped up, and in consequence become swollen. This irritation spreads to the adjacent tissues, and so inflammation arises. Finally, the contents of the duct undergo degeneration, suppuration occurs, and the contents become mixed with pus, small abscesses result at various depths in the skin, and so require more or less time to break out.

This inflammatory condition of the sebaceous glands with their ducts is apt to become chronic and may prove an obstinate affection. It occurs most commonly about the face, on the back between the shoulders, or on the chest. The skin is rough to the touch, the ducts of the sebaceous glands are enlarged, and the skin is greasy.

Eczema.—This is the most common of all skin affections. It is a non-contagious, inflammatory disease of the skin, sometimes acute, but more often chronic, attended with itching and desquamation or loss of cuticle. With the itching may be a feeling of heat and tension in the part.

Eczema is a local disease, brought about by a local irritation in the skin; but, in addition to this, there is generally a predisposing cause, as some disorders of the digestive tract, a bad condition of the blood, and so forth. The skin, like other organs of the body, depends on the whole system for its nutrition. When this nutrition is not sufficient, the skin appears pale, of a peculiar color, and is easily taken up in folds, an evidence of poor nutrition of the skin. When the skin is not properly nourished, every slight irritation is liable to produce eczema.

t of Liver Spots, Sallow Complexion, cne, and Eczema.—First, the general treat-le every case of skin disease must be treated the peculiarities of that patient's case, still, neral rules which should be followed in the all cases, and first in importance comes at-e bowels. There must be procured, by some er, a free daily evacuation. A hard, consti-nent is not sufficient. Fruits and vegetables atives and the very best. Water is also a l 3 pints a day should be taken, not only for effects, but also because this amount is needed kidneys properly flushed. Of the simple xatives, one of the best is the effervescing the phosphate of soda; the dose is from one to one tablespoonful, to be taken in a glass r on rising in the morning. Sometimes pa-re troubled with gas cannot take anything esces; in that case, the plain phosphate of substituted

Pure air, associated with the proper kinds of exercise, promotes the functions of the skin, assists in keeping the blood in good condition, increases the vigor, keeps the complexion clear, and increases its beauty, while, on the other hand, a sedentary life in a confined air produces a pallid and frequently a blotched skin, with headache and dyspepsia.

A thin condition of the blood, which is known as anemia, is another source of skin diseases. After the digestive system has been gotten in a good condition, some form of iron is generally necessary, which, if taken when the digestive tract were not in good condition, would do more harm than good, as it would only tend to still further clog up the system.

Sweating baths are of the highest value as a means of ridding the skin of its accumulated impurities, and in unloading the obstructed sebaceous follicles of their hardened contents.

In eczema tub-baths must be avoided, and soap and water be used sparingly. Bran may be added to the water, or baking soda, in the proportion of one teaspoonful to the basin of water. The water should always be soft. The use of water on the face should be at once followed by the use of cold cream.

Local Treatment.—Without the correction of the impaired functions of the general system, no local treatment can afford anything more than mere temporary relief; but, as a rule, local treatment is necessary in addition to the general treatment.

Steaming the Face.—It seems that the blood-vessels of the skin are much better able to absorb vapor than water. The vapor penetrates and softens the epidermis much better than the simple application of water would. The increased secretion from the skin which is thus caused is beneficial. After using the vapor bath, the outer layers of the epidermis peel off and the complexion is improved by the substitution of new pigment. The absorption of the moisture also causes a roundness of the skin and a

f the wrinkles. Generally, vapor baths can hose cases of skin diseases where the skin is lry. Next in importance to the vapor bath the face. Bathing the face with very hot recommended.

f the Skin.—Where the complexion is sallow, tendency to pimples or blotches, massage of e face will do much to improve the circulation. ge is most effective when it follows steaming he face in hot water. The tips of the fingers pped in cold cream, and then, pressure being them, the skin of the forehead should be ed from the middle line out over the temples. uld be stroked from the bridge outward and The skin of the cheeks should be pinched up between the fingers and thumb. All these facilitate the emptying of the follicles.

f black points, the too frequent squeezing ntents must be guarded against; also the too ure of the fingers. These are often so deeply

with an opening of about 1 inch. This not only massages the face, but tends to empty the ducts. The face is again washed with soap and hot water, rinsed off with hot water, and is then dashed for a moment or two with cold water and wiped dry. After this the remedial application is made. These procedures are best carried out at night. In the morning tepid water is used to wash the face.

The following preparations will be found to be effective in many cases. Take of the sulphate of zinc and the sulphuret of potassium, each, 1 dram; glycerin, 10 drops, and water, 4 ounces. If any irritation or scaliness results, the remedy should be intermitted for one or two nights and a good cold cream used instead.

For freckles and liver spots the following prescriptions will be found useful: Take of powdered borax, 1 dram; of the hyposulphite of soda, 2 drams, and dissolve in 4 ounces of water. This should be applied after washing the face with hot water. The wash may be applied with the fingers or with absorbent cotton; it is to be immediately followed by this powder. Take of the oleate of zinc, 2 drams, and of the oxid of zinc, 1 ounce. This must be well mixed and powdered finely. It should be applied with absorbent cotton, while the skin is still moist from the use of the wash. This covers the face with a mask, and should be used at night only. As both of these applications are astringent, their use must not be kept up for too long a time, or the skin will become dry and rough. They are very effective where the skin is greasy.

For an obstinate case of freckles or liver spots the following is recommended: Take of the corrosive chlorid of mercury, 6 grains; of the oil of lavender, 10 drops; of alcohol, 1 ounce; and of glycerin, 2 ounces. Mix well, and apply at night.

For *hyperidrosis*, or profuse sweating in the axilla, of the feet or hands, take of salicylic acid, 15 grains; of starch, ½ dram; and of talcum powder, 1 ounce. Mix well, and dust over the parts night and morning.

such an obstinate affection that the patient ce seek the advice of a good physician; for he disease lasts, the more difficult its cure

Superfluous Hairs.—One of the best depila- s of the sulphid of barium, 2 drams; the oxid starch, each, 3 drams. Mix these well, and corked. At the time of the application suffi- is added to make a paste, which is thickly he part and allowed to remain on for a min- It is then washed off and a little soothing lied. A variable amount of redness follows; to allow the paste to remain on long enough e hair, and, at the same, to limit the resulting Ordinarily, a slight burning or sensation of indication that the paste has been on long e application is repeated as soon as the hair bout every one or two weeks.

hydrogen may be used instead for its bleach- s, especially in patients with a dark growth.

dejection, when the angles of the mouth curve downward, and so forth.

There are twenty-eight muscles about the mouth. Since all these muscles are developed by use, the mouth comes to assume the expression given to it by the thoughts of the individual. The figurative expression, "down at the mouth," comes to be literally true, and the angles of the mouth are seen to be habitually drooping, until at last this is the fixed expression of the face. A healthy frame of mind is the only means to keep the face from

Fig. 3.—Muscles of the right side of the head and neck.

being converted into a map of wrinkles and drooping angles at the mouth.

The wrinkles are not, as a rule, caused by any trouble in the skin itself, but in the underlying muscles, the tissues of which have become relaxed or weakened. The circulation of the parts may be stimulated, and so increased nourishment be secured by deep massage of the muscles, and, at the same time, the use of a good cold cream will aid in the nourishment of the skin.

The face should first be washed and steamed according to the directions already given. The massage of the face

s be carried out in a systematic manner. he forehead. Stroke with the two thumbs head, starting near the eyebrows, and work he roots of the hair. In the second move- nd is used to stretch the part worked upon, ction is made with the tips of the fingers of d.

s about the eyes, stroke with the tips of the nd below the eyes, from the nose toward the eat care must be taken not to apply too much out the eyes, lest some of it should get into he removal of the "crow's feet" at the outer ye stretch the part with the thumb and finger nd perform friction with the tips of the fingers and.

the lines that run from the corners of the nose of the mouth, stroke with both hands, one on he face, beginning at the center and lower oke upward toward the temples. This up-

soft and creamy. The Dover egg-beater will give it the desired creamy appearance.

The Hair.—From an esthetic point of view, a head of luxuriant hair is a matter of prime importance to the woman.

The hairs are peculiar modifications of the epidermis. The hair follicle is a cylindric-shaped depression of the skin, whose funnel-shaped mouth opens on the free surface. Immediately below this is a constriction, called the neck, which is the narrowest part of the follicle; the duct of the sebaceous gland, which supplies the hair with oil, opens at this point. The base of the follicle is bulb-shaped, to accommodate the hair-papilla and the hair-bulb. The hair-papilla contains the blood and nerve supply for the hair. When a hair is plucked or falls out, a new hair grows from the hair-papilla.

According to Pincus, the life of a hair ranges from two to six years, after which it falls out, to be replaced by a new one. In this way about fifty or sixty hairs are normally shed every day.

In order to have thick, luxuriant, silky hair great attention must be paid to the condition of the scalp, since it is the scalp which contains the blood-vessels that nourish the hair. The scalp should be thick and pliable and move freely over the bones of the skull. If the scalp is drawn tightly over the bones of the skull, it tends to constrict the blood-vessels, and so lessen the supply of blood to the scalp and cause atrophy of the roots of the hair from pressure.

The hair has a great tendency to accumulate dirt. It catches the dust flying in the air, and also retains the secretion of fat and the desquamated epithelium of the scalp and the products of perspiration.

The two chief causes of the premature thinness of the hair are a deficient circulation of blood in the scalp and dandruff, and it is said that dandruff causes the loss of hair in 70 per cent. of all cases.

Dandruff.—The last few years has witnessed a revolu-

iews of the skin specialists in regard to the druff. Previous to that time it was consid- y a collection of epithelial scales mixed with oily matter. Now, following the investiga- re first instituted by Unna, dandruff is con- symptom of a parasitic disease of the scalp, heic eczema. Sabouraud believes that the e that produces seborrhea causes the loss of elieved that the parasite grows down into the between its walls and the hair.

eczema is a chronic desquamative inflam- scalp of bacterial origin. It is divided into he first may last from one to seven years; it ith more or less dandruff in the form of scales of the hair; or the dandruff may unite with ucing fatty crusts which are removed with his is followed by the second stage, in which out.

of Seborrheic Eczema.—In the dry form of the hich there is a scaling of the scalp, the hair is

Causes of Seborrheic Eczema.—The general causes are debility, constipation, and anything which undermines the general health. The local causes are lack of cleanliness of the scalp, and using combs or hair-brushes which have been used on the scalps of persons who were suffering from this disease.

In most families will be found one or more members who possess enough seborrheic infection to cause the spread of the disease throughout the rest of the household.

Causes and Treatment of Premature Thinness of the Hair and Baldness.—It has already been stated that 70 per cent. of these cases were caused by seborrheic eczema. Among other causes may be mentioned a progressive tightening of the scalp upon the skull, the scalp having lost the cushion of fat that is under it in early life; insufficient or improper care of the scalp; daily sousing of the head in cold water, combined with improper drying of the hair afterward; sweating of the head; constant mental strain, either on account of intellectual work or worry; wearing stiff, unyielding hats; gout, and all diseases which lower the general nutrition.

The chief treatment is by prophylaxis, or using preventive measures to insure the healthy condition of the scalp. And first and most important of these is cleanliness. Because of the great length of time which it takes to dry long, thick hair, many women do not wash the scalp often enough. In the healthy state of the scalp it should be washed at least once a month.

The Care of the Hair.—There is never any danger of shampooing the healthy scalp too frequently. The oil in the scalp is not removed by washing, but is, on the contrary, always increased through the improvement in the circulation. Where there is much dandruff, or if the hair has begun to fall out prematurely, owing to long neglect or following an illness, it is well to begin by washing the hair two or three times a week, and then gradually increase the interval to every two or three weeks.

he water cleanses the scalp well, but its con-
is injurious; the same may be said of am-

best shampoos is the tincture of green soap.
t be obtained, take of the official green soap
d of alcohol, 1 ounce; mix well, and make
ne ounce of the tincture or its substitute
uted with twice as much water and applied
vith the tips of the fingers. When enough of
has been used, add sufficient water to make
. This must be thoroughly rubbed into the
over the whole systematically. After the
nsed, the soap must be well rinsed out of
his may require many changes of the water,
t important. Dry the hair with hot towels,
eing completed by a radiator or stove oven.
hair will hasten the process very consider-
air should then be loosely braided and a hot
around the head to insure perfect dryness
and as a prevention against taking cold.

her own exclusive use, and that no one should allow a public brush or comb to be used on her head.

The brush and comb must be washed once a week in water containing a little ammonia; they must be well rinsed out in pure water; the brush should be dried quickly, with the bristles down. If the brush and comb are not cleaned sufficiently often, the scales of dandruff would be sufficient to reinfect the scalp.

Massage of the Scalp.—The scalp should be thoroughly massaged every night. Grasp the scalp with both hands laterally, as well as anteroposteriorly, and with some pressure loosen the tissues from the underlying parts and try to raise it in folds, or it may be pinched with the forefingers, producing some vascular flux and a sense of warmth.

Stelwagon recommends the use of electricity two or three times a week, by means of a metallic brush attached to a faradic battery.

If the scalp is too dry, nothing is better than pure vaselin, though some persons prefer olive oil, applied by means of a dropper. The yolks of eggs beaten up with lime-water make an elegant shampoo.

For the cure of dandruff, the following prescription will be found to be of great service. Take of resorcin, 2 drams; of grain alcohol, 3 drams; of glycerin, ½ ounce; and of rose-water, a sufficient quantity to make 4 ounces. This should be applied to the scalp with the fingers every night before the massage of the scalp. Since resorcin sometimes undergoes a change of color that gives to light, gray, or white hair a dingy, or dirty yellowish color, this may be obviated by the addition of 10 grains of salicylic acid to the ounce of the solution.

For an oily condition of the scalp with thinness of the hair the following is an excellent formula: Take of the carbonate of ammonia, 20 grains; of the tincture of cantharides, 1 dram; of alcohol, ½ ounce; and of bay-rum, a sufficient quantity to make 4 ounces. This should be well mixed, and applied at night with a good massage to the scalp.

ess with thinness of the hair, take of the tinc-
ntharides and of the tincture of capsicum,
nces; of castor oil, 2 drams; and of cologne
unce. Mix well and apply at night. Or a
containing more oil is the following: Take
ure of cantharides and of the tincture of cap-
, 2 drams; of cologne water, 1 ounce; and of
sufficient quantity to make 4 ounces.
the Hair.—Dragging or twisting the hair from
direction, pulling it into constrained or arti-
ons, and even twisting the hair very tightly
to it.
ng iron acts by abstracting more moisture on
the hair than on the other. The stronger the
re easily it will curl, and the longer it will stay
e daily use of a hot iron, notwithstanding
t care, will in a short time prove injurious;
apt to become thin and fall out. Its growth
d with. The use of kid curlers is much less

ness of the hair is caused by obscure changes in the nutrition of the hair-papilla, which interfere with the production of the pigment. As a rule, the hair whitens first on the temples, then on the top of the head.

The hair first turns gray at its root. The grayness is due to the loss of pigment. Prolonged residence in either a very cold or a very hot climate will cause the hair to turn gray.

A yellowish tinge of the hair is sometimes seen in patients with jaundice, or gray hair may owe its dull yellow color to the tint of dry albumin of which it is composed. The glitter of steel-gray or silver-white hair is due to the high refractive power of the minute air-bubbles that lie in the substance of the hair.

Treatment.—The color cannot be restored to gray hair. The roots of the hair are embedded in the hair follicles, and cannot be reached by any fluids applied to the scalp. Not only is the use of hair-dyes to be deprecated as an exhibition of poor taste, which happily is going out of fashion, but the use of hair-dyes is extremely dangerous. Cases are being constantly reported by physicians, where the use of these supposedly simple vegetable hair-dyes has been followed by very serious and extensive dermatitis of the face, neck, and shoulders.

Gray hair is really very beautiful when it is of silvery whiteness, and very ugly when it is of a yellowish-white color. It must be treated with much greater care, in order to preserve its silvery whiteness, than was necessary to keep the hair in good condition before it lost its coloring pigment. It should never be wet, except when it is shampooed. For this reason, instead of using hair-curlers, crimping pins should be used. In this way the hair is waved quite as well and the use of water is avoided.

The Cosmetic Care and Treatment of the Hands.—Of all the members of the body, next to the face, the hands have the most expression, and serve as an index of character and refinement.

Not only should the most scrupulous attention be given

to having clean hands and nails, but every precaution should be taken tó keep the skin soft and the nails carefully manicured. This is quite possible for the housewife, simply by wearing rubber gloves while she does her work. It preserves the fine sense of touch in the fingers, which aids in sewing and embroidery, at the same time that it adds much to the beauty of the hands.

Chapped Hands.—To prevent chapping of the hands in cold weather heavy gloves must be worn or a muff carried. Another aid in the prevention of the skin of the hands from becoming rough and chapped, and the best means for curing them if this has occurred, is by the use of a good cold cream at night, just before retiring. The cold cream should be well rubbed in the skin, especially about the finger-nails, and after this talcum powder be dusted over. This forms a thick covering for the hands, the talcum powder prevents the cream from being rubbed off on the bed-clothes, and, on getting up in the morning, the skin will be found to be soft. Only in case the hands are very badly chapped should old kid gloves be worn at night.

Cosmetic of the Nails.—The physiologic function of the nails is to protect the tips of the fingers against pressure and to give them a firm support; this increases the delicacy of the tactile sensations.

The nails should be slightly curved from side to side, of a light rose color, and smooth surface. The lunula should be visible at the root of the nail. Brittleness of the nails is a defect, which causes them to tear easily; it is generally due to the condition of the general health.

There is a natural tendency for the dirt to accumulate on the under surface of the nail, between it and the finger. This is not only unsightly, but it is often the cause of actual danger, as this forms a lodgment for the germs of disease. Not only is it necessary for doctors and nurses to give the most scrupulous attention to the care of the nails, but, when we learn that one cook has been the cause of spreading typhoid fever through a number of families,

in her itinerary in going from place to place, we must be impressed with the necessity of more careful oversight being given to the hands of domestics and housewives who prepare the food.

For the same reason, it is self-evident that the hands should always be washed immediately before going to the table, and cleaning the nails is always a finishing touch in the washing of the hands.

For the purpose of cleansing the nails, an orange stick or nail-file should be used, and never the point of the scissors or the blade of a knife, for either of these causes a roughening of the under surface of the nails, whereby the lodgment of dirt becomes only the more securely fixed. After the use of the nail-file, the nail-brush should be used, followed again by the use of the file or stick. If there is a tendency to a roughening of the skin under the nail, it can be obviated by the use of cold cream at night. Just before retiring, the fingers should be dipped into cold cream, and let the tips take up just as much as they will retain, and after this dipped into talcum powder.

The small rim of epidermis which laps over the nail should be gently shoved back with the orange stick every day. This skin, when torn, forms the so-called hang-nails, by which infection easily enters the system; it may give rise to felons or even to general blood-poisoning.

Warts.—These are unsightly blemishes on the hands. They may be removed by the systematic use of the following lotion: Take of salicylic acid, 1 dram; flexible collodion, 1 ounce. Mix well. This should be painted on the wart with a camel's-hair brush twice a day for two or three days, without removing the pellicle. At the end of that time the wart should be soaked in water and scrubbed with pumice stone. This usually brings away part of the horny covering. The treatment is continued until the wart has entirely disappeared.

When the warts are small, they may often be removed by simply keeping them dry and applying boric acid.

e of the Feet.—In the care of the feet it must
ered that the leather of the closely fitting boot
little ventilation, and so more attention must
the airing of the feet as well as to their bathing.
ould be bathed twice daily.

ng the toilet for the evening dinner both shoes
gs should be changed, the stockings hung up in
nd the shoes left out to air and dry, instead of
ed into the shoe-bag, to remain there until
orning.

ol rub will be found very refreshing to weary
profuse perspiration of the feet, boric acid or
der may be used, dusting the powder over the
ight and morning.

g Toe-nails.—The common causes of ingrowing
e improper foot-wear and an improper method
he nails. If the nail is cut too short, especially
es, while at the same time the shoe is too short
ow, the skin of the toe is forced over the nail,
ecessarily happens that, by the further growth

painful. Soft corns come between the toes, and unless absorbent cotton is inserted to prevent the rubbing of the toes together, a second corn appears on the opposing surface of the adjoining toe. A very effective remedy for this is the application of blue-stone, or sulphate of copper, to the corn. The stone is moistened in water and then applied thoroughly to the corn; absorbent cotton should be placed between the toes. In very severe cases it may be necessary to stay off the feet for a few days and keep the foot upon a chair.

Hard corns must be cut down with the greatest care. It should be done directly after the bath, so as to have the skin in as nearly an aseptic condition as possible. A small scalpel, composed entirely of steel, should be kept for this purpose. It must be thoroughly cleaned after it is used, and just before its use be sterilized by boiling for five minutes. The reasons for these precautions are the possibility of cutting into the flesh and setting up blood-poisoning by the entrance of germs into the wound.

After the corn has been cut down, an application of the following prescription will hasten its disappearance. Take of the extract of cannabis indica, 15 grains; of salicylic acid, 1 dram; and of flexible collodion, 1 ounce. Mix well, and apply by painting over with a camel's-hair brush. The application should be repeated every night.

CHAPTER III

THE DIGESTIVE SYSTEM AND THE MAINTENANCE OF GOOD DIGESTION

The Digestive Tract; the Care of the Mouth and Teeth; Digestion a Chemical Process; Digestion in the Small Intestines; the Microörganisms of the Alimentary Canal; the Importance of a Varied Diet; Classification of Food-stuffs; Tea, Coffee, and Cocoa; the Temperature of Foods and Drinks; Factors which Favor Good Digestion.

Over-eating; Dietary in Sedentary Occupations; Heart Failure and Other Ills as the Result of Chronic Underfeeding; the Causes of Indigestion; the Symptoms of Indigestion; Intestinal Indigestion; Biliousness and Bilious Attacks; Ptomain Poisoning; Diet in Indigestion; Treatment of Acute Diarrhea; Chronic Intestinal Catarrh; Constipation and Mental Troubles; Treatment of Constipation.

The Physiologic Action of Moderate Doses of Alcohol; the Effect of Alcohol on the Muscular System; the Effect of Alcohol on the Nervous System.

THE activities of animals are carried on by a certain expenditure of energy, which is set free as the result of a chemical breaking down of the living tissues of the body. In order to maintain the equilibrium of the body, this waste must be replaced by new material, which is taken into the body in the shape of food and drink.

In the human body the digestive processes are brought about by mechanical disintegration; by the action on the food-stuffs of acid and alkaline fluids; by changes produced by active substances called ferments; and, lastly, decomposition is produced by the growth of microörganisms.

The **digestive tract**, or alimentary canal, begins at the mouth and ends at the anus. It consists of the mouth, the esophagus or gullet, the stomach, the small and large intestines. Two large glands, the liver and pancreas, pour their secretions into the small intestine to aid in the di-

gestion of foods. The alimentary canal, liver, and pancreas together constitute the digestive system.

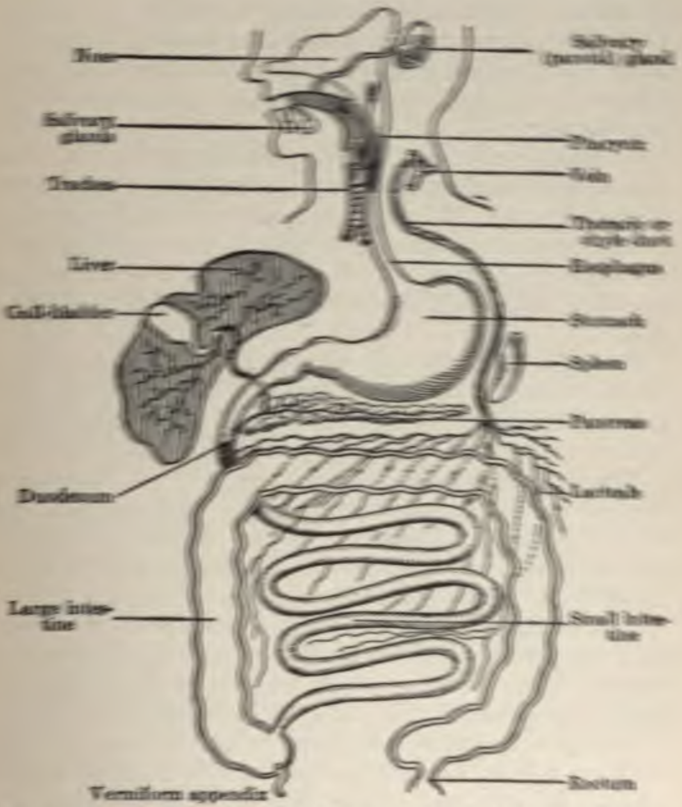

Fig. 4.—General scheme of the digestive tract, with the chief glands opening into it (Stockton).

The contraction of the muscular walls of the digestive tract is the propelling power that carries the food downward, while the contractions of its pouch-like dilatation, the stomach, cause churning movements that bring the

ontact with its secretions. These movements as the mechanics of digestion.

stive tract is lined throughout its entire course membrane; that lining the mouth gives some character. It is from the mucous membrane stomach and small intestines, as well as from d pancreas, that the digestive juices are poured ity.

g downward the food meets with five different uids: the saliva in the mouth, the gastric juice nach, and the bile, pancreatic, and intestinal e small intestines. Each digestive fluid acts ne particular kinds of food. This action of the uids on food is called the chemical part of diges-

when it is known that so many of the diseases y are caused by germs, it is evident that the re must be exercised in the selection of foods, paration, and in the care of the intestinal tract.

the heat and moisture of the mouth, acting on these small particles, cause their decomposition and set up acid fermentation in the mouth, and it is this acid which causes the decay of the enamel and finally of the teeth. The decayed tooth gives still further lodgment to particles of food, and these, left to decompose, give rise to the most offensive gases, giving fetor to the breath, poisons the blood, and so injures the digestive and nervous systems.

Where possible, a tooth-pick and dental floss should be used immediately after each meal, the waxed dental floss between the teeth, and the curved end of the tooth-pick being used to remove any particles that may have worked in about the roots of the teeth and gums.

A tooth-brush with good tooth-powder should be used twice a day. The brush should not be too broad, and is better if slightly curved. The bristles should not be too hard. The use of tooth-powder, which must be very fine, or tooth-paste, is needed to produce sufficient friction to clean the teeth well. Warm water is a better solvent than cold, and, therefore, it is well to use it for cleansing the teeth.

While it is generally known that decay if neglected will destroy a tooth, it is not so well known that many teeth are lost as the result of the accumulation of tartar at the gum margin. There is a tendency to this accumulation, especially about the necks of the lower incisors and upon the teeth that are not used in chewing. The deposit of tartar encroaches upon the neck of the tooth, presses upon the gum; the latter becomes irritated or inflamed, and recedes from the tooth; malnutrition and loosening of the tooth follow.

With very imperfect or decayed teeth proper mastication is impossible.

The teeth should be examined by a good dentist twice a year, so that small cavities shall be discovered in an early stage, the tartar removed, and the teeth kept in their best condition. This will prevent the early loss of the teeth. Lost teeth must be replaced so that the teeth shall be

opposite each other, and another important factor in mastication is that the teeth shall strike properly.

Digestion a Chemical Process.—Briefly stated, the process of digestion consists in the liquefaction of the

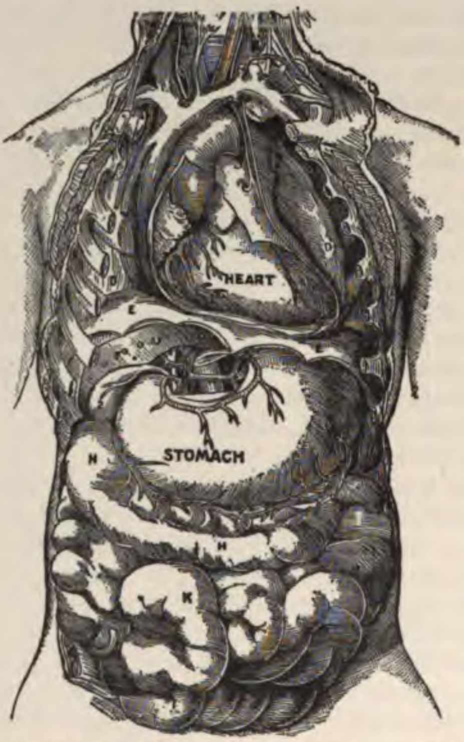

Fig. 5.—Location of the viscera of the body and their relation to each other: D, D, Lungs with air expelled; E, E, diaphragm cut away to show, F, liver cut to show stomach; 2, gall-bladder; H, H, large intestine; K, small intestine; L, vermiform appendix (after Heath).

solid portions of the food and the conversion of the insoluble parts into soluble. The last named is accomplished through the action of the digestive ferments.

The work done in the alimentary canal is comparable to that done in a chemical laboratory. In order to effect the necessary changes in the foods, and render them of use in the body, there are secreted daily about three pints of saliva, twelve pints of gastric juice, two or three pints of bile, one pint of pancreatic juice, and a large amount of intestinal juice.

Altogether the amount of fluids poured into the alimentary canal in the twenty-four hours is much more than the whole of the blood in the body; and, moreover, it is probable that every portion of the blood passes several times into the alimentary canal during this period.

In other words, there is constantly going on in the body between the blood and the products of digestion a great ebb and flow; new substances are taken up by the blood for the repair of the tissues, and the worn-out substances are thrown off.

The mouth is the only portion of the digestive canal which is under the control of the will. When the food is finely divided, it presents a much larger surface for the action of the gastric juice, and so the time that it remains in the stomach will be very much shorter than when it is swallowed in large chunks, and the very act of chewing increases the secretion of saliva.

The *saliva* not only protects the mucous membrane of the mouth, but it keeps it free from all food-particles, which, if allowed to remain, would decompose, and thus injure the teeth by the action upon them of the acids produced. It also moistens the dry food, aids in the process of swallowing, and has some action on the starchy substances of the food. By the process of mastication then the food is divided into small particles and thoroughly admixed with the saliva, until the whole is converted into a fine pulp.

The secretion of saliva is a reflex one, and is increased by the sight, smell, or thought of savory viands; and it be almost wholly suppressed by a state of mental Movements of the jaws without anything in the

lso cause a flow of saliva. Besides favoring cal part of digestion and its slight chemical rchy foods, saliva, being an alkaline fluid, is timulation to the secretion of the gastric

as greatly emphasized the necessity for thor- ation. He holds that food should be masti- duced to a state of liquefaction; by this means hat a smaller amount of food is necessary to health and efficiency of the body.

ood has been reduced into a pulp in the mouth, ge of the starches into sugar has begun, it is nd passes into the next compartment of the paratus, namely, the stomach.

ch may be felt at the lower extremity of the in the triangular space caused by the di- the ribs. It is a large, hollow, compound alls of which contain muscle-fibers in addition es which elaborate the special secretion. Its

membranes, and does at once pass into the veins and lymphatics of the stomach.

While these changes are taking place the thick, turbid, grayish-looking liquid is from time to time ejected from the stomach, accompanied by even large morsels of solid, less digested matter. This may occur within a few minutes of food having been taken, but the larger escape from the stomach does not begin till from one or two, and lasts from four to five hours after meals, such pieces as most resist the action of the gastric juice being the last to leave the stomach. The movements of even a full stomach are said to cease during sleep. During the intervals of digestion the stomach is quiescent and empty.

An important rôle is played by the nervous system over the digestion of food, and a very practical point is that the secretion of gastric juice may be wholly arrested by any violent emotions. In the presence of healthy gastric juice and the absence of any nervous interference, the question of the digestibility of any food is determined chiefly by mechanical conditions. The more finely divided the material, and the less the proteid constituents are sheltered by not easily soluble envelopes, the more rapid the solution.

Briefly, then, the work done in the stomach is that meats and allied substances are dissolved and transformed into a substance that is capable of passing through membranes, and does pass into the blood at once. If large quantities have been eaten, the surplus passes into the intestines, where its digestion is completed. Envelopes containing starches and fats are dissolved, setting these bodies free. The fats are melted by the heat of the stomach and tend to run together in large drops, forming an imperfect emulsion.

As a general rule, one hour is the time required after an ordinary meal for the first portion of the gastric contents to pass into the small intestine. The process goes on for a considerable length of time, the pylorus opening in a rhythmic manner every five or ten minutes, until all the

stomach-contents have passed through. The larger the meal and the more solid the contents, the longer the process takes. Of all the bodies which make up the food, fat is the last to leave the stomach.

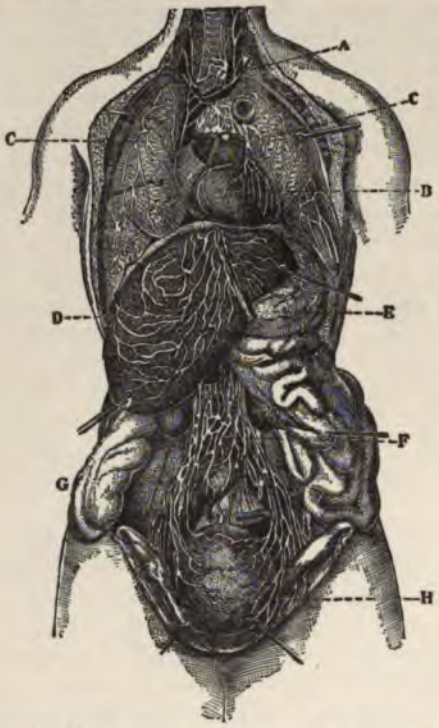

Fig. 6.—The ribs removed, showing relation of thoracic to abdominal viscera: A, Trachea; B, heart; C, C, lungs; D, liver; E, stomach; F, small intestine; G, large intestine; H, bladder (after Masse).

Digestion in the Small Intestine.—Digestion is completed in the first portion of the small intestine, called the duodenum. This forms a kind of U-shaped tube; the degree of distention of this tube seems to have

some effect in the emptying of the stomach: so long as the duodenum is full, no further escape of food from the stomach takes place.

When the partially digested food or chyme passes into the duodenum, it mixes with the bile, the pancreatic, and intestinal juices which it finds there.

The *bile* arrests the action of pepsin; it assists in emulsifying the fats and in their absorption; it exerts an antiseptic action on the contents of the intestinal canal; it moistens the coats of the intestines, and assists in giving the feces their normal amount of water, without which they cannot readily be evacuated. It thus acts as a natural laxative and increases the peristaltic action of the intestines.

The second action upon the food in the intestine is that of the bicarbonate of soda contained in the pancreatic and intestinal juices, which neutralizes its acidity, and pancreatic digestion can only take place in an alkaline medium.

Pancreatic juice is remarkable for the power it possesses of acting on all food-stuffs, starches, fats, and proteids. It contains four ferments—trypsin, which acts energetically on the proteids which have passed from the stomach unchanged; a diastatic ferment, called amylopsin, which converts starch into sugar; a ferment which acts upon fats; and another ferment, which acts upon milk, curdling it.

It is probable that when proteids are taken in excess they undergo pancreatic digestion, and it is quite possible that this pancreatic digestion of an excess of proteids is accompanied by a considerable development of bacteria and other organized bodies, which create trouble by inducing fermentative changes in the accompanying saccharine contents of the small intestine.

The digested substances pass directly from the small intestine into the lymphatics and blood-vessels. Since the amount of secretions from the small intestines is almost as great as the amount of absorption from it, the contents remain liquid throughout its course. The nutri-

ts are all absorbed before the large intestine
Here, owing to the absorption of water,
s become converted into solid feces, which
lor from a bright orange to a dirty brown.
bile is cut off from the intestines, the feces
-colored and constipation results.
gestion ceases, there is a cessation of contrac-
the mucous membrane, which was deep red
sted, now becomes grayer, and the whole
restored to a condition of repose.

roörganisms of the Alimentary Canal.—
bers of bacteria flourish in the mouths of all
pecially around the base of the teeth, and form
of the tartar.
eat majority of cases uncooked food contains
ber of microörganisms. Raw food, especially
is green, carries with it into the alimentary
ge number of bacteria. Also meats, which
kept too long, and foods which have been in-
preserved, contain a large number of fungi

to believe that the inability to digest fats renders one peculiarly liable to become the victim of tuberculosis.

Classification of Food-stuffs.—There are five classes of food-stuffs: the organic, comprising proteids or albuminous food-stuffs, carbohydrates and fats, mineral salts, and water.

All vegetable and animal food, whatever their nature, and whatever their origin, are composed simply of representatives of proteids, carbohydrates, and fats.

Proteids are a source of energy, and contribute to form and to keep up the primary active protoplasm of cells and their accessory or inactive constituents. Fats are also sources of energy and may supply a portion of inactive material composing cells. Carbohydrates have a similar function to that of fats. The mineral salts are not producers of energy in the body, but are indispensable, both for the active or protoplasmic part and for the inactive framework of the cell. Water acts as a general solvent, and is a necessary agent for the various metabolic processes.

Proteids, water, and mineral salts are absolutely necessary for the preservation of the life of animals. Proteid substances can be so altered in the body as to supply both the fats and the carbohydrates when required. Fats and carbohydrates alone are not sufficient to support life, but, if these two classes of foods be given along with proteids, they diminish the amount of albuminous food necessary.

Animal food is believed to make the blood richer in fibrin and corpuscles and to increase the mineral salts, especially the phosphates. It makes the muscles firmer than they were under a vegetable diet, and it favors the reduction of superfluous fat. It increases the urates and urea, and tends to make the fluids of the body more acid. It increases the functional activity and the resisting power of the body. On the other hand, an increased animal diet necessitates an increased amount of oxygen for its proper burning up in the system. Meat is more

; and strengthening than vegetable foods, and
o a feeling of energy.
eat-eating is not counterbalanced by a proper
exercise in the open air, an excess of waste
produced, which accumulates in the system
biliousness and an excess of uric acid, which
o rheumatism, gout, etc.
erally accepted estimate is that meat should
urth and vegetables three-fourths of the diet.
cannot perform more muscular labor on an
meat diet than on one of starches, but he
e animal food to replace the general wear and
muscular tissues; energy for muscular contrac-
vided by the non-nitrogenous foods or carbo-
Meats give strength, but the carbohydrates
endurance which is needed for prolonged

unt of food for the twenty-four hours has been
s rather more than one pound of fresh meat,

boiled, it should, for the same reason, be plunged into boiling water.

On the other hand, in treating meats in order to obtain "stock" for soup, cold water should be used, and the temperature slowly raised, but not quite to the boiling-point, in order that as much as possible of the soluble ingredients may be extracted.

Eggs are almost as nutritious as meat. They are most easily digested when soft-boiled or poached. Dry toast, finely broken up and mixed with a soft-boiled egg, aids in its digestion. Soft-boiled eggs are more easily digested than raw eggs, but raw eggs are less irritating to the stomach, probably because they are digested in the intestine.

Fresh Meats.—The breast of chicken, fresh beef, and mutton are among the most easily digested of the solid foods. Raw and rare meats are more easily digested than well-done meats; in other words, cooking lessens the digestibility of meats. Veal and pork are both very difficult of digestion. Steak should be broiled and never fried; all fried foods are very difficult to digest.

Milk is the most digestible of all foods if consumed in a reasonable way. The addition of Vichy or lime-water renders the milk less liable to form tough clots, hence renders it more digestible. Boiled milk is more digestible than raw milk; boiling increases the toughness of the curd, but it destroys all bacteria.

Milk is a fluid only outside of the body; when it enters the stomach, it is converted by the rennin into a solid clot; the clot formed in the stomach of infants is much less firm and more easily digested. Anything which will prevent the formation of this clot will hasten its digestion. The milk should be sipped slowly, and not a tumblerful gulped down at a swallow. Bread or cracker, broken up in the milk, aids in its digestion; also the addition of equal parts of barley or aërated waters. Buttermilk and kumiss are more easily digested than cow's milk. A glass of milk is digested in about two hours.

s differ from animal food in containing a much
portion of material which, for man, is indi-
l much less nutritive material. Vegetables
are both rendered more digestible by cooking.
ar, especially in strong solution, is an irritant
nach. The liver makes all the sugar that is
the system when none is taken in the food.
to this, all the starch that is taken as food is
nto sugar in the body. Many foods contain
oney, molasses, milk, raisins, dates, figs, and,
kinds of fruit.

gar is taken in excess, it undergoes fermenta-
limentary canal, being converted into alcohol,
nd acetic acids. This fermentation and its
pede the work of the liver, make the system
friction, prevent the elimination of effete
nd, after long-continued use, cripple all the
f life.

pplies to most people the largest amount of fat
but its use should be supplemented with the

digested by the same persons. Vinegar retards salivary digestion and the digestion of those carbohydrates with which it is combined.

Tea, coffee, and *cocoa* all retard gastric digestion. Cocoa is the most nutritious. Both tea and coffee are pure stimulants. Coffee should never be taken more than twice a day, and the amount should be limited to one cupful of coffee at breakfast and a demi-tasse after dinner. Its well-known power as a brain stimulant leads to drinking it in excess; it then seriously interferes with digestion, and its continuous excessive use may lead to chronic dyspepsia and insomnia.

The amount of harm done by tea depends to a great extent on the way in which it is made and the quantity which is taken.

Tea improperly made is capable of doing so great an amount of harm to the digestive and nervous systems that emphasis must be laid on the necessity of making it properly.

The Proper Method of Making Tea.—The water should be freshly boiled; the tea-pot heated, so that the water will be maintained at the boiling-point; one teaspoonful of tea is allowed to the cup. The tea is measured out, put in the tea-pot, and the requisite amount of boiling water poured over it. It is then allowed to stand on the kitchen table, not the range, from two to three minutes, and should then be strained into the tea-pot for the table and served. Unless the tea-leaves are strained off, the infusion continues for some time; this extracts the tannic acid and the bitter principles. In addition, the prolonged infusion dissipates the volatile oil, to which much of the fragrance of a good cup of tea is due. As it is almost impossible to have the requisite amount of care exercised in the making of tea in the kitchen, it is much better that it should be made on the table. Sugar detracts from the healthfulness of the beverage.

Water constitutes about two-thirds of the weight of the body, so that water is both a tissue-builder and a food.

pints of water are given off daily in the form of s excreta and exhalations, but, since about one- e solid foods taken consist of water, 3 pints of en as such is sufficient to counterbalance the loss.

mperature of Foods and Drinks.—The ideal re of food and drinks is about that of the body ld food is difficult to digest, for it does not stomach sufficiently, nor does it possess the g properties of a hot meal.

es of temperature in foods should be avoided, to produce local injury to the stomach; from)° F. are probably the limits of safety.

at a temperature of 122° F. are sufficient to body, and a temperature of 45° F. is sufficient to In both extremes there is danger of exciting tarrh. The temperature best suited to quench is from 50° to 70° F. Ices should be avoided, ay cause dyspepsia, neuralgia about the heart, acute dilatation of the stomach.

which Favor Good Digestion.—The stomach

the same hour every day. The perfectly healthy woman should never take anything to eat between meals.

Gentle exercise may aid digestion, while severe exercise, by diverting much blood and nervous energy to the muscles, would have an adverse effect. Sleep directly after a hearty meal is injurious and sometimes proves fatal, because there is a depression of the circulation, and the digestive processes may stop absolutely during sleep. The best employment after a hearty meal is frivolous conversation, which keeps the heart alive, without making too great demands on the brain.

A hearty meal should never be eaten when one is exhausted or greatly fatigued. Half an hour's rest before dinner is a great aid to digestion.

Certain conditions are imperative in order to maintain a healthy state of the digestive organs and of the body. These are both physical and psychic. A good caterer, a good cook, a cheerful frame of mind, and the proper leisure to eat the meal are all essential factors.

The influence of the psychic on the process of digestion has not been sufficiently well understood. It is intimately bound up with the sensations of appetite and hunger. Appetite is the most powerful excitant of the gastric juice. Hence the importance for digestion of such important aids to appetite as agreeable surroundings, a well-appointed table, and good cooking.

A very practical point is that gastric secretions may be wholly arrested by violent emotions. On the completion of a hearty meal, which has been eaten with the greatest relish, the arrival of a telegram containing the intelligence of the death of a friend or of a heavy financial loss causes the dinner to lay like lead on the stomach. This shows the important rôle played by the nervous system over the secretion of the digestive juices.

Water.—With the proper mastication of the food there will be less desire to drink water during the meal; a glass of water should be slowly taken at the end of the meal.

Water is not absorbed by the stomach, but passes

to the small intestine. A pint of hot water
o the intestine in about three-quarters of an
t is taken. Hot water has a powerful stimulat-
n the peristalsis of the stomach, and so is a very
l to sluggish digestion. It should be taken one
meals, so as to wash out the stomach, and not
at the time the meal is taken.
a very dangerous vehicle for infection. The
ethod of rendering water harmless is by boiling.
n of a little wine or even spirits does *not* destroy

eral waters promote digestion, by causing an
more abundant secretion of the gastric juice.
n.—The waste matter which collects in the
l must be evacuated every day. Allowed to
er than this, the digestive system is clogged by
noval of worn-out material, and the blood is
absorbing matter which is poisonous to the
omposition goes on without being suspected
erer

Obese patients grow fat because they overeat, but with a thorough mastication of the food their appetites would be satisfied with far less food than they have been accustomed to eat and the superfluous fat would drop off.

Thorough mastication is also useful to thin persons, who have been in the habit of bolting their food, and have gotten indigestion as the result. They eat less food under this system, but they get fat under it.

When such an excess of proteids is taken into the body that it cannot be disposed of in the ordinary process of oxidation or burning up, there are solid chunks of unburned material that must be gotten rid of by the liver and kidneys, which is injurious to them. As a result, the liver and kidneys are overworked in their efforts to rake down the ash produced by the combustion of proteids within the body, and eventually are not able to dispose of the surplus; gastro-intestinal disturbances, bilious attacks, gout, rheumatism, and other diseases follow.

The chief factors leading to overeating are the uses of wines and condiments at dinner and elaborate course dinners. The first two overstimulate the appetite, and the great variety offered by the latter tempt the appetite, and make it possible to eat more than one could if the bill of fare were more limited and simple.

Dietary in Sedentary Occupations.—The important considerations in the question of a diet are what to eat, how to eat, and how much to eat. The appetite is not a safe guide in very many cases, because persons engaged in sedentary occupations, who take next to no outdoor exercise, are frequently in a run-down condition and have very poor appetites.

It is not that the average woman eats too much, but that she does not eat the right kind of things. She eats too little fresh meat and eggs, and drinks too little milk. She eats very much too much sweets, in the form of pastry, cake, or candy, and the lunch is not sufficiently nourishing.

The age and occupation of the individual are important

be taken into consideration in making out the

owing dietary has proved to be the most satis-
r women having no occupation or a sedentary
it women have maintained good health, and
r women have recovered their health.
t.—Fruit, bacon and eggs, breakfast hominy,
ast and butter, a glass of milk, and one cup of

t may be any raw fruit in season, except apples
; apples should always be cooked for breakfast,
ey are more easily digested; bananas are too
indigestible to be served for breakfast. Stewed
good and especially laxative.
s not a necessity, though it is an appetizer.
be served in any way; but they are most diges-
t-boiled or poached.
niny is boiled in water and served as a vege-
a little salt and butter, but *no* sugar.
e noted that the cereal so generally served for

served with each meal; it should be taken after the meal is finished, and one glass is as much as should be taken.

Vinegar should never be placed on the table, nor be used in salad dressings, for reasons which have already been given.

For a French dressing, lemon-juice should be substituted for vinegar. The following are the correct proportions: take one tablespoonful of lemon-juice, one tablespoonful of water, and two tablespoonfuls of olive oil. Mix well, and pour over the salad just before serving.

The greatest variety possible in the menu from day to day is advised, but not any greater variety for the daily meals than that given above.

Heart Failure and Other Ills as the Result of Chronic Underfeeding.—A long-continued deficiency of food or improper kinds of food leads eventually to general malnutrition, anemia, and finally to failure of the heart itself. At first the muscles of the heart and cells of the brain are nourished at the expense of other structures, from which a definite daily quantity is taken to provide their supplies of albumin, but there comes a time when these organs also suffer.

Debility from underfeeding comes on so insidiously that it is often far advanced before being recognized by the sufferer. Frequently it is only by comparing the present condition with that of six months ago, and noting the greatly decreased power of endurance, that the woman realizes that something must be wrong. Further, this condition constitutes part of a vicious circle; with the decline of strength, there is often a decline of appetite, which leads to a further loss of both, and a more or less decided collapse eventually occurs.

This underfeeding may have occurred as a result of ignorance, or from an ill-advised dieting for disease, as, for instance, rheumatism or gout, or from poverty.

An expression often employed by this class of sufferers is that they have "lost heart." It is believed by some authorities that this de the

e heart muscle is at last sharing with the other
the general malnutrition. As a result of this,
robably fails and dilates, and is perhaps never
o keep up the same blood-pressure, to produce
uscular nutrition, and the former strength of
ve, and will-power. A nutritious diet and rest
ge are the best means to restore as far as pos-
effects of such a condition.
ts stand out boldly in this connection. In the
there must be sufficient proteid food ingested
the organism from body loss; and, secondly,
be a sufficient heat value in the fats or carbo-
protect the body fat of the person and so
aciation. In regard to the proteid require-
as been found, by investigation, that about
meat per day is necessary.
ate of the system there is a weakening of the
gans; the more their nutrition fails through
the less they are able to digest. This is often
pepsia, and the first step in the cure is to com-

The love of purposeless destruction, exhibited by the Parisian communists in our own day, may be fairly credited to deficient food. No well-fed people could have wrecked the Vendôme Column, or burnt the Town Hall and the Tuileries, of which they were so proud. "They were like hungry children smashing their dolls."

The Causes of Indigestion.—Normally, the process of digestion is effected unconsciously; the individual is not aware that she has a stomach. It may be accepted as an axiom, that when any organ or any part of the body persistently obtrudes itself on the attention of the owner, there is some abnormal or pathologic condition present.

Some of the more prominent causes of indigestion are: imperfect mastication, septic stumps of teeth, an excessive quantity of food, improper kinds of food, food taken at too frequent intervals, alcohol, tea, and coffee, and exhaustion of the nervous system.

Imperfect Mastication.—Defective teeth are responsible for much imperfect mastication of food. The opposing teeth may have been lost, or soreness of the gums or sensitive teeth may prevent the act of mastication from being properly performed.

When the food is not sufficiently well subdivided, the saliva and gastric juice cannot mix properly with it, gastric digestion will be retarded on account of the small area of food presented, and the prolonged stay of food in the stomach increases the opportunities for fermentation. Since chewing is one of the chief excitants of the flow of saliva, it is much better that the work should be done in the mouth than in the kitchen.

Septic Teeth.—As a result of these, microörganisms may be swallowed with the food and act injuriously on the stomach. They may irritate the mucous membrane and set up a chronic gastritis, or these bacteria may cause a fermentative process in the stomach.

An excessive quantity of food may produce symptoms by its bulk in several ways: it may so distend the stomach as to give rise to sensations of weight, fullness, and pain;

unt of food taken may be in excess of the powers
ric juice to digest, and digestion in the stomach
prolonged that the stomach cannot empty
e the next meal; or the bulk of food may be so
s to mechanically impede the movements of
h; or excessive bulk of a vegetable nature will
ith its own digestion, by increasing the peristal-
mall intestine to such a degree that it will be
g before it has had time to digest.

or Indigestible Foods.—For practical purposes,
bility of any food may be gauged by the length
ch it remains in the stomach, since the stomach
food as soon as it has been reduced to a semi-
stence. Certain articles of diet so react on
as to produce an insoluble substance. For
rong tea, taken with any meat meal, converts
n of the meat into a dense precipitate that is
indigestible. Claret and coffee both delay
Again, the combination, already mentioned,
with the carbohydrates, as in salads. Cheese

diseases of the present day. The injurious effects of alcohol upon the stomach are that it acts as a local irritant, producing dilatation of the vessels of the stomach and subsequent gastritis; by overstimulating the secretion of hydrochloric acid, it leads to hyperacidity of the stomach; the tartrates and malates contained in wine are decomposed in the stomach, setting free organic acids, while the acetic acid and yeast in beer set up an acetic acid fermentation in the stomach-contents. Alcoholic drinks, when taken in large quantity, eventually produce dilatation of the stomach.

Alcohol taken into the stomach along with the food has two periods of action: during the first of these the digestion of albumin is impeded; after the absorption of the alcohol the secretion of hydrochloric acid is increased to two or three times the normal amount; even after stomach digestion is completed, the secretion of hydrochloric acid continues longer than it normally would.

Tea.—In addition to the injurious action of the tannin of the tea on the albuminous constituents of food, excessive tea-drinking causes digestive disturbances by its action on the nervous system, which is similar to that of tobacco; it dilutes the contents of the stomach below the point of concentration at which digestion can efficiently take place, by the undoubted tendency that constant distention of the stomach with hot liquids has to produce atony of the stomach-walls. Tea is most injurious to neurasthenic persons.

Both tea and coffee act powerfully to retard digestion. Coffee acts more energetically, as it is generally taken much stronger. It is certain that the ordinary use of coffee as a beverage must interfere greatly with gastric digestion.

Eating when in a state of nervous exhaustion or great physical fatigue, prolonged mental strain, or excessive grief may be sufficient to cause severe dyspepsia.

The Nature of Indigestion.—From the excessive mucus in the stomach, as in chronic gastritis, the food will be

ucus which will prevent the ready access of
, or there may be an excess of hydrochloric
gastric juice, as the result of the irritation of
g glands from the use of alcohol, tobacco,
or the lack of mastication.

ufficiency of the stomach or atony of the stom-
ay result from general weakness, or have been
cal irritation in some of the ways above men-

rolonged stay of food in the stomach there
composing mass, teeming with microörgan-
he acrid and irritating nature of this results
the intestines and a practical arrest of the
cesses.

ronic catarrh of the intestine or colitis, as it
ere may result diminished peristalsis, which
stipation.

er hand, when the peristalsis is increased, the
ied along the intestines, with the inevitable
he absorption of water is interfered with and

may be due to the hypersecretion of hydrochloric acid. Pain coming on when the food has reached the stomach shows some abnormally sensitive condition of the mucous membrane. Pain at the height of digestion, or about three hours afterward, is almost invariably due to an excess of hydrochloric acid. Pain coming on four hours after meals is due to the fact that the stomach has not emptied itself; abnormal fermentation takes place, with the formation of acrid organic acids, which irritate the mucous membrane or cause an evolution of gas which distends the stomach.

Eructations of gas may be due to an atonic condition of the walls of the stomach, and the gas which would normally pass into the duodenum accumulates and distends the stomach, or the gas may be due to the fermentation of food, due to its prolonged stay in the stomach.

There may be an eructation of a small quantity of acrid fluid, which may or may not be brought up into the mouth. This liquid may give rise to a sensation of heat and constriction of the throat, called pyrosis or heart-burn; or the eructation may be neutral or alkaline—the so-called waterbrash; this most usually occurs in the morning on an empty stomach. There may be a furred tongue, with loss of appetite. This may be caused by a poisoned condition of the blood circulating through the stomach, where the blood is loaded with the effete products of metabolism.

The term *metabolism* includes all the chemical processes taking place in the body, by which the available elements of food are prepared for nutrition, changed for incorporation into the tissues and fluids, used up for the purposes of movement or vitality, and, finally, altered into forms capable of excretion.

Intestinal Indigestion.—This is a much more common form of functional disturbance than gastric indigestion. It is a well-established fact that the greater part of the digestive work is done in the duodenum, by the hepatic and pancreatic fluids. The duodenum, also called the second stomach, has none of the peculiar characteristics

cle which receives crude substances that the s. There is a much greater sensitiveness of l canal than of the stomach, which is accounted act that the sympathetic nervous system sur- ntestines.

of *Intestinal Indigestion.*—The tongue is bby and indented at the edges by the teeth; avily coated white, or yellow in case of bilious- e is a bitter, coppery taste in the mouth, due ic acid, a common symptom of lithemia, or to oxidation of albumin, fatigue, headache, he ears, disturbances of sight, loss of memory, d vertigo, and emaciation.

of appetite leads to habitual underfeeding, e organs themselves become weakened, and n are not able to properly digest the food. protracted indigestion may lead to as profound as tuberculosis itself.

ss and Bilious Attacks.—During the period there is a physiologic congestion of the liver;

The nights are restless, filled with dreams or nightmares; there is often a tendency to wake up at the same early hour every morning. On rising, there is a thick, metallic taste in the mouth, frontal headache, an inaptitude for mental work, and a feeling of despondency and depression.

There may be a cumulative auto-infection which has been going on for years. The eyes and skin are jaundiced with black rings under the eyes; the skin is dry, pale, and muddy, with more or less eruptions. There may be a scarlet redness of the nose and cheeks and eczema. The hands and feet are cold. The pulse is feeble, and the patient is anemic from the impoverishment of the blood. The individual is depressed, irritable, and languid.

Treatment.—The best treatment is to take 2 grains of calomel just before retiring. If this causes a free evacuation of the bowels within ten hours, nothing more is necessary. If not, some saline laxative must be taken. After this, the first thing on rising in the morning, one teaspoonful to one tablespoonful of the effervescing granules of the phosphate of soda should be taken in a glass of cold water. This acts very pleasantly on the liver, and is, at the same time, a mild laxative. The dose of calomel must never be repeated under one month's time. The alkaline mineral waters are good, especially those of Contrexéville and Vittel.

Most important in the treatment of all these cases is the daily exercise in the open air, and at least one hour's brisk exercise is essential. Cold sponge or other cold baths, given according to the condition of the patient, as directed in the chapter on Hydrotherapy, and a proper ventilation of the house day and night.

Ptomain Poisoning.—This usually causes an acute attack of indigestion, coming on within a few hours after the ingestion of the poisoned food, as canned lobster, chicken, and fish. The symptoms are usually nausea and vomiting; severe pain in the stomach and intestines; there

ise of temperature, and either constipation or

t.—It is essential to empty the stomach as ossible, so that the poison may not be absorbed re system, and for this purpose free vomiting oduced. This may be accomplished by the he back of the throat by the finger, or by taking pint of lukewarm water with a little table salt r the stomach has been emptied, one glass of ater, containing one teaspoonful of the bicar- soda—baking soda—should be taken to dis- ucus and to wash out the stomach.

le of hours 2 grains of calomel should be given. not act freely within ten hours, it must be a seidlitz powder or some other saline laxa-

here has been no nausea or vomiting, and the ion that the woman has ptomain poisoning rence of rigors, castor oil should be given, as it uickly than calomel, and, in addition to clear-

third part Vichy, or, any of the following may be given: chicken broth, barley water, the white of egg beaten up with plain water, beef-juice, or beef-tea.

In all these cases the first thing to do is to get the mucous membrane of the stomach and intestine in a healthy condition. This is best accomplished by drinking a glass of very hot water three times a day.

Next in importance comes attention to the diet. Since the digestive organs are weakened, only such foods must be taken as are most easily digested.

The following is a very good diet in this class of cases:

Breakfast.—A soft-boiled egg, or an egg poached on toast, dry toast, and a glass of hot milk. If the milk disagrees with the stomach, it may be diluted with one-third part Vichy. If there is a tendency to constipation, a baked apple, without sugar, may be added to this.

Luncheon.—Raw oysters in season, cold roast lamb, beef or chicken, bread, and a very little butter, apple-sauce, stewed pears or peaches, and a glass of hot milk.

In changing from a liquid to a solid diet it is well, before giving solids en masse, to give beef sandwiches for several days.

The sandwiches are made as follows: A piece of tender, juicy steak is scraped with a blunt knife in a direction parallel with its fibers. In this way the pulp is freed from the fibers; it is then seasoned with a little salt and spread thinly on a dry piece of stale bread. This makes a very delicate and palatable sandwich.

Dinner.—A thin soup, beef, lamb, chicken, or broiled steak; one of the following vegetables: celery, raw or stewed with white sauce, potatoes baked in the skin; asparagus with white sauce; lettuce with a French dressing, made with lemon-juice; cranberry jelly. There must be no desert. A glass of water may be sipped slowly after the meal is over.

When the digestion improves, a cupful of weak tea may be taken for breakfast and lunch.

If the digestion is so weak that very little can be

taken at one time, a cup of beef-tea, chicken, or mutton broth, with a plain cracker, should be taken between meals. A glass of hot milk may also be taken before retiring.

It is very important to remove all fat from meat broths. The broth is allowed to become cold, and the fat is first skimmed off with a spoon; after this, a torn piece of white blotting-paper removes all the small particles of fat which may have been left.

The following articles of diet must not be taken: Rich soups or chowder, veal, pork, hashes, stews, turkey, gravies, fried foods, liver, kidney, pickled, potted, or smoked meats, or fish; goose, duck, sausage, crabs, lobster, salmon, hot breads, pastries, candies, cheese, ice-cream, nuts, bananas, ice-water, malt, or spirituous liquors.

Treatment of Acute Diarrhea.—In case of acute diarrhea the patient should remain in bed. If there is severe pain, a hot-water bag often gives relief. The diet should consist of scalded, not boiled, milk and dry toast. A glassful of hot water should be taken three or four times a day.

The most effective procedure in these cases is to wash out the bowel itself with hot water, which contains one teaspoonful of table-salt to the pint of water; this removes the mucus and is an astringent to the inflamed mucous membrane.

For the medicinal treatment a good physician should be summoned at once, as the cases are frequently very serious, and, at best, may run into a chronic form of a catarrhal inflammation of the bowels. The longer the duration of the disease, the longer does it take to accomplish a cure.

Chronic Intestinal Catarrh.—There may be constipation or diarrhea, or the two may alternate, but in the chronic forms there is more apt to be constipation. Fecal accumulations may sometimes be felt by placing the hand over the abdomen, which may be so hard that they can be removed neither by purgation or clysters.

If the catarrh is situated in the lower part of the intestine or in the rectum, the scybala are enveloped in mucus or blood, and sometimes, after much tenesmus and bearing down, only large quantities of mucus will be voided. A frequent result of this condition is piles, associated with an intense itching or burning, which extends up into the rectum.

Constipation and Mental Troubles.—A noted French writer states that there is no person afflicted with mental troubles who is not a sufferer from constipation, at least in the early and curable stage of this malady, as well as from stomach, liver, and intestinal disturbances. Even in the normal individual constipation brings about torpor of ideas, inaptitude for work, and a bad temper, while the autointoxication, which is caused by constipation, is a prolific source of neurasthenia.

It must be remembered that the intestine is a permanent source of poisons, which, under certain conditions, cause grave alterations in the principal organs, notably in the liver, kidneys, and skin, and serious functional disturbances of the nervous system.

Normally, the organism manages to protect itself against the microörganisms which are found in the intestines; given, however, certain conditions, the toxic products can be generated in excess of the powers of the organism to dispose of them, such as errors of diet, quantitative or qualitative, atony of the muscular walls of the intestine, and, above all, constipation. The higher up in the intestine the stasis occurs, the more serious is the result. Constipation is considered by many surgeons as the most important factor in the production of appendicitis.

There is frequently a condition present which is known as semiconstipation, and which is most deceptive to the patient. There may be a bowel movement every day, but the bowel is never emptied; only the lower portion of the hardened fecal matter is broken off. This is repeatedly found to be the case in examining women for some form of pelvic trouble, and in a woman who says that she

y evacuation of the bowels, and has had one that ning, the sigmoid flexure will be found to be ith hardened feces.

the clogging up of the digestive system by the val of the waste-products of digestion, the of hemorrhoids, which is caused by the mechani- ure on the veins, and so interferes with their out in the normal way, and the general auto- on of the entire system, there are also caused in erious displacements of the pelvic organs, to- th their congestion and inflammation.

neral symptoms of autointoxication are: head- tigo, palpitation of the heart, a feeble and irreg- e, irritability of temper, melancholia, numbness ng in the hands and feet, and the emaciation and eight are sometimes so marked as to lead to the of malignant disease.

ent of Constipation.—This should always be e, and the diet is a most important factor. The ld be of a coarse quality, that is, such as directly

quently happens that constipation is the result of irregularity in going to the toilet. The school-girl or woman gets up a little late, and, although she may feel the inclination to empty the bowels, she is able to defer it.

If the movement is sufficiently large, one stool daily is sufficient, but where the stool is slight in quantity, there may be two or three during the day, entirely consistent with health, and in a run down state of the system there are apt to be several small movements rather than one full stool. So long as the stools are not watery, the individual may rest assured that there is no looseness of the bowels.

Constipation should never be allowed to become chronic. It is, as has already been shown, the progenitor of myriads of the most serious diseases; and, after the bad habits of years have been established, it is one of the most obstinate of diseases to cure. In every case a good physician should be consulted at once, and the treatment should be persevered in until the cure is complete. It is a well-known fact that all medicines for this trouble lose their effect, the dose has to be increased, and a frequent change made from one laxative to another. When everything else fails, electricity may be resorted to. It is one of our most valuable remedies, since it brings about a cure through the toning up of the muscular walls of the intestine.

The constant use of hot clysters to empty the rectum is one of the most pernicious habits; in this manner the bowel becomes overdistended and loses its tone, and the fecal mass is not sufficiently large to cause the distention of the rectum, which is the normal stimulus leading to the desire to defecate.

The Physiologic Action of Moderate Doses of Alcohol.—The result of a series of experiments by Dr. Parke were as follows: "By quickening the action of the heart, it shortens the interval of rest, and, therefore, interferes with the nutrition of the heart. It also produces palpitation and breathlessness. Even small doses of alcohol, by increasing unnecessarily the action of the heart,

us. It acts on the nervous system by lessening y and the delicacy of the impressions, as well as ng the power of control of a train of thought. by this same blunting of the nervous system, muscular power is impaired, and the finer movements are less perfectly made. It causes of the temperature of the body, and, although to overcome the effects of exposure to cold, it earned that persons who take it are less able to exposure to cold."

esult of modern scientific investigation and extion, alcohol with its compounds has been taken list of beverages, where it has heretofore been with tea and coffee, and out of the list of foods, lass it had been admitted because of the known of alcohol in the body, and has been placed in f drugs known as narcotics, alongside of ether, , opium, and cocain—all of them, the most ugs in the Pharmacopeia, yet, when used by ds, the most beneficent.

per cent.; whisky, 44 to 50 per cent.; brandy, 48 to 56 per cent.

These alcoholic beverages are often made still more harmful by adulterations by ingredients in themselves harmful.

A large percentage of alcohol is also found in bitters and patent medicines.

We will consider the subject of alcohol under the following aspects: First, the question of alcohol as a food; second, the effects of alcohol on the digestive system and the metabolism; third, the effects of alcohol on the heart and the muscular system; and fourth, the effects of alcohol on the nervous system.

First, Is Alcohol a Food?—The substances used as foods act in providing energy for muscular work, in maintaining the heat of the body, in building up of the tissues, and in saving the waste of the tissues. Moreover, a food which does harm to any organ, or to the system as a whole, when taken in moderate repeated quantities, becomes a poison for that individual.

A food may be defined as any substance which, when absorbed into the blood, will nourish, repair waste, and furnish force and heat to the body, without causing injury to any of its parts or loss of functional activity. From any one of these four standpoints alcohol cannot be regarded as a food.

The physiologic effects of alcohol and real food-stuffs are totally different. Fats, carbohydrates, and nitrogenous foods after mastication at once begin to be digested and assimilated, and to fulfil the true functions of a food by maintaining a natural temperature, pulse-rate, and tissue repair of the body, without any disturbance of its mental and physical functions and activities.

Alcohol, on the contrary, is absorbed from the stomach unaltered by the digestive processes; circulated in the blood in its original form, it at once interferes with the ordinary activity of the brain and other organs, and, by its anesthetic action, hampers the mental and phys-

ities and interferes with the processes of meta-

fects of Alcohol on the Digestive System and n.—The local action of alcoholic liquids is ly destructive on an empty stomach; and when trong solution, but it is also known that smaller en continuously, are liable to effect the digestive a slower though similar way.

urious effects of alcohol are that it acts as a local roducing dilatation of the blood-vessels of the nd subsequent gastritis; it leads to hyperacidity, ating the secretion of hydrochloric acid; the and malates contained in wine are decom- the stomach, setting free organic acids, and lucing acidity; the acetic acid and yeast in p an acetic acid fermentation in the stomach-

r taken alone or with food, the tendency of alco- ghout is to lessen the churning movements of

changes set up in many cases gouty conditions, accompanied by mental depression and irritability.

Diseases of the liver occur more frequently as the result of taking frequent small doses of alcohol, though never reaching the stage of intoxication, than as the result of indulging more freely, but at longer intervals.

The Effect of Alcohol on the Blood.—The blood is a mixture of corpuscles and a fluid known as the blood plasma. The corpuscles are of two kinds—red and white. The red blood-corpuscles are the oxygen carriers; they carry the oxygen to the tissues, where they readily give it up. They are constantly being destroyed by the liver and spleen, and are replaced by new ones, which come from the red marrow of bones. The white corpuscles are much fewer in number, but they play a most important part in protecting the body against disease. It is now about twenty years since Professor Metchnikoff, of the Pasteur Institute of Paris, announced to the world his discovery that the white corpuscles have the power of destroying the microbes to which so many diseases are due. These white blood-cells form the standing army or policemen of the body, and their duty is to attack, and, if possible, to destroy, any foreign matter, such as dust or disease germs.

The plasma of the blood contains various kinds of salts, and include sodium chlorid or common salt, the phosphates, and chlorids of calcium and potassium.

The way which the body fights disease is partly by means of the white blood-corpuscles, which totally destroy the germs, and partly by the increase in the blood of those chemical substances which are antidotes for the poisons given out by the germs.

Alcohol taken into the stomach is quickly absorbed and reaches the blood in two minutes. The maximum of alcohol is found in the blood in fifteen minutes after it is swallowed.

The blood is the medium by which food and oxygen are conveyed to the tissues, and by which the refuse material

issues is carried away; alcohol interferes with processes.

cells are liable to become damaged and anemia t has now been proved that even tiny doses of ralyze more or less the white cells, and thus inh their power of destroying microbes. Chemices tend to exert a delaying or inhibitory iner the chemical processes of the body. These rocesses are oxidation, the storing up of nutrimanufacture of secretion, the production of l muscular movement, and the excretion of erials.

test possible difference exists as to the rate at ation goes on. When there is nothing to hinder nce, the poisonous toxins and waste matters burned up and eliminated and health prevails. y its affinity for oxygen, robs the tissues of ich they would otherwise use for combustion. tissues are kept starving for oxygen, metabo-

Gradual deterioration in the heart power is a cause of premature death. One of the early indications that the foregoing changes may be occurring in a heart is a sense of fatigue and breathlessness on slight exertion, or a feeling of disinclination for normal effort. The result of such depression of the efficiency of the heart is often seen when the individual is attacked by some disease; she succumbs to heart failure, instead of being able to resist the disease. This probably accounts for a great many deaths between forty and sixty years of age.

Further, it must be remembered that all the nutritive action of the blood depends on its power of rapidly filtering through the walls of the blood-vessels to the tissues, and, conversely, its power of drawing off the waste-products of the tissues depends on the facility with which such products can penetrate its walls.

As soon as degeneracy sets in, the walls of all vessels tend to become thickened, and the active transference through them, more and more prevented; the nutrition of the body is thus gravely hampered, and, with the advance of this thickening of the walls, the vessels are less able to adjust themselves to the variations in pressure from within; and, finally, when unable to withstand the pressure, they rupture, causing hemorrhage and apoplexy, which, when occurring in the brain, cause paralysis and mental decay.

A similar degeneration takes place in old age, but the point is, that many persons, instead of waiting until old age comes to them, deliberately precipitate these senile changes.

The Effect of Alcohol on the Kidneys.—The elaborate mechanism of the kidneys consist of a filtering system of thousands of tubules, arranged closely side by side, whose function it is to carry away from the body the waste material, which otherwise would interfere with the vitality of the different organs.

The part played by the kidneys in rapidly eliminating effete material cannot be too carefully safeguarded.

Anything which interferes with its work will sooner or later cause a retention of waste-products in the system, and will also permit of the escape of valuable albuminous materials of the substance of the blood through the filtering apparatus. The effect of alcohol upon the kidneys can only be described as disastrous. In proportion as the kidney shrinks, there is a diminution of the excretion of urine, and, finally, the condition known as Bright's disease is established.

The Effect of Alcohol on the Muscular System.—The muscular tissue forms 43 per cent. of the body weight. It has been proved that under the moderate use of alcohol the muscles become flabby and less vigorous and effective; that troops cannot work or march on alcohol; that in training for athletics, for races, or for other sports, total abstinence is always practised; the true sportsman depends quite as much on his brain as on his muscles for success. In England it is recognized that total abstinence is a necessity where great exertions are concerned, and it is now beyond all question that alcohol, in even so-called dietetic quantities, diminishes the output of muscular work, both in quantity and quality, and that the best physical results are obtained under total abstinence from its use.

Alcohol actually lowers the temperature of the body from three-fourths of one degree to three degrees. This depression of temperature is not transient, but lasts for several days, so that its use, when the person is exposed to intense cold, is extremely hazardous to life.

The Effects of Alcohol on the Nervous System.—Kraepelin has carried out a series of experiments to prove the effects of small doses of alcohol on the output of work. In all mental work there are two elements to be considered, namely, quality and speed. Now, all observers are agreed that the quality of mental work is affected even before speed, more mistakes being made. Tests were made in reading aloud; in adding figures in various combinations; in type-setting; and in memorizing; in all

these instances it was found that, after taking moderate doses of alcohol for a number of consecutive days, the work done was less, was less accurate, and that there was a decrease in the power of memorizing.

Another series of investigations, made by Rudin to determine how long the intellectual abilities continue to be depressed after the effects of alcohol pass off, showed that the effects of a single dose of alcohol persisted until noon or evening of the next day.

Von Helmholtz, one of the greatest observers and thinkers of the nineteenth century, noted on himself the effect of alcohol in interfering with the highest powers of thought and conception. Describing the conditions under which his highest scientific thoughts had matured and come to fruition, he said: "As far as my experience is concerned, they never come to a wearied brain or at the writing-desk; they were especially inclined to appear to me while indulging in a quiet walk in the sunshine or over the forest-clad mountains, *but the smallest quantity of alcohol seemed to drive them away.*"

Professor Sikovsky's testimony is that "alcohol diminishes the rapidity of thought, makes the imagination and the power of reflection commonplace and deprived of originality, acts upon fine and complex sensations by transforming them into coarse and elementary ones, provokes outbursts of evil passions and dispositions, and in this predisposes men to strife and crime, and upsets habits of work and perseverance."

Self-control is one of the highest functions of the brain, and the racial power which results to a people as a consequence of the individual practice of self-control cannot be too highly estimated. Therefore, children are trained as far as possible to control their emotions and actions. Alcohol diminishes and breaks down this power of acquired self-control, undoing the work of parents and educationalists. Quite small doses are often responsible for reckless and self-pleasing actions, which are far reaching in their results in loss of moral tone and self-

ne ideals of duty are lost sight of, and, at best, ndividual in a laissez-faire attitude. Among ant effects of alcohol are intellectual lethargy of fatigue, which, combined with the other en the capacity for genuine enjoyment and

CHAPTER IV

THE RESPIRATORY AND CIRCULATORY SYSTEMS: THE KIDNEYS

The Mechanics of Circulation and Respiration; the Circulatory Apparatus; the Lungs; Hygiene of the Lungs and Its Relation to the General Health; Relation of Respiration to Body Heat; the Respiratory Functions of the Abdominal Muscles; the Importance of Good Chest Development; Proper Relation Between the Height, Weight, and Chest Measurements; Chemical Properties of Air; Town and Country Air; Dust and Its Relations to Disease; Rôle Played by Bacteria; Ventilation; the Injurious Effects of Overheated Air; the Proper Degree of Moisture for the Air of the House; Ventilation of Bed-rooms.

Care of the Nose, Throat, and Ears; Impediments to Respiration; Ventilation of the Lungs and Breathing Exercises; Cure of Chronic Bronchitis by Deep Breathing Exercises; Relation of Colds to Pneumonia and Tuberculosis, and Their Prevention.

The Kidneys and Their Function; the Physiology of the Female Pelvic Organs.

It is said that diseases of the lungs are the cause of four-fifths of all indispositions, ill health, and actual disease among civilized people, and that, between the age of fifteen and twenty-five, almost one-half of the mortality is due to pulmonary tuberculosis.

This almost universal weakness of the lungs, as it may be styled, is a product of modern civilization, and is caused by our unhygienic mode of life. Too little importance is attached to physical development, and well-developed lungs can only be found in a well-developed chest; too little time is spent in outdoor exercise; and private houses, public conveyances, and public assembly rooms are not properly ventilated.

Good development of the chest and lungs, and thorough and systematic ventilation of the lungs, are essential to a strong heart, a vigorous circulation, and power of the tissues to resist disease.

The Mechanics of Circulation and Respiration.—In order to understand the mechanics of circulation and respiration, it is necessary to appreciate four fundamental facts—that the thorax is a distensible, air-tight cage; that it contains and is filled by the heart, lungs, and great blood-vessels; that the exchange of gases in the blood takes place in the lungs; and that, on the development of the chest and respiratory muscles, depend the development of the lungs and the force of the circulation.

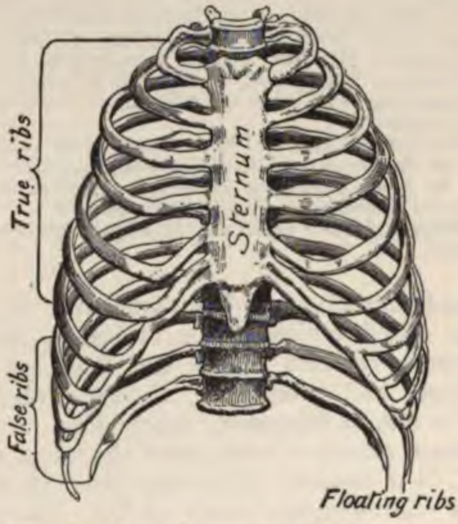

Fig. 7.—The bony thorax, anterior view (Ingals).

The Thorax.—The chest or thorax is a cone-shaped, distensible cage, formed of bones, elastic cartilage, and muscles. The spinal column forms the fixed part of this living cage, and the ribs are attached to this in such a way as to allow of their being raised in inspiration, thus increasing the anteroposterior and the lateral diameters of the chest.

The thorax is converted into an air-tight cavity by

means of muscles. The base is made up of one huge muscle, the diaphragm. This is attached at its border to the ribs and posteriorly to the backbone. It is the diaphragm which separates the cavity of the thorax from that of the abdomen. When the diaphragm is relaxed, it has a concavoconvex form, the convexity being directed toward the chest, and the heart and lungs rest directly on it, while the concave surface covers or rests on the liver.

The Circulatory Apparatus.—This consists of a central force and suction-pump, the heart, and a series of elastic tubes that grow smaller the further from the heart they are situated; they divide and subdivide, like the branches of a tree. The smallest arteries, called capillaries, from their hair-like size, are so minute that they only allow the passage of a single corpuscle at a time and their walls are transparent.

The heart is a somewhat cone-shaped organ, placed between the two lungs; it is situated more or less obliquely in the chest, immediately back of the breast-bone. Roughly speaking, the base of the heart corresponds to the right edge of the sternum, while the apex lies a little below and to the right of the left nipple.

The heart is divided into a right and left side. The left side forms the force pump, whose motive power is supplied by the contraction of its own muscle-fibers. The bright red blood, with its fresh supply of oxygen—hence its color—flows from the lungs into the left heart, which then contracts automatically and forces the blood into the arteries of the body.

The arteries consist of a series of elastic tubings; hence, the smaller the tubing, the greater the resistance which has to be overcome by the force of the heart's beat, so that during violent exercise, when the contraction of the muscles causes a pressure on the minute arteries and capillaries situated in them, the more forcible must be the beat of the heart to overcome this additional resistance. Likewise, when the surface of the body is suddenly

chilled, as by a plunge into cold water, all the vessels situated here contract, and, again, more work is thrown on the heart.

The three chief factors in the mechanics of the circulation are the force and frequency of the heart's beat, the peripheral resistance, and the elasticity of the arterial walls. Any disturbance between these relations brings about abnormal conditions.

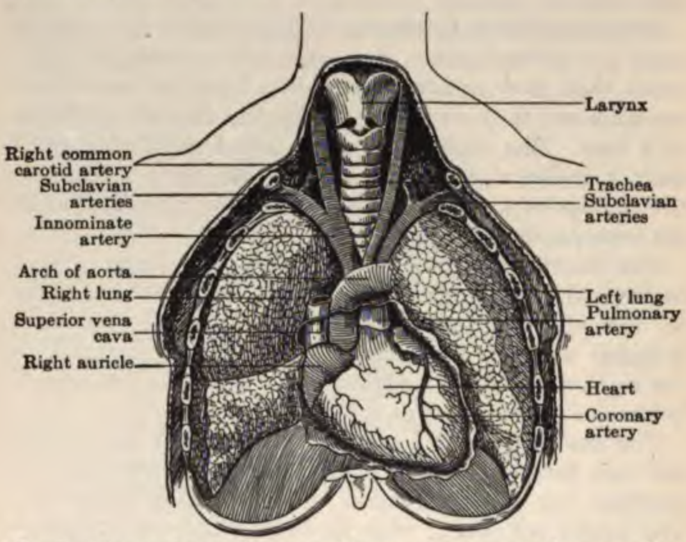

Fig. 8.—Front view of heart and lungs, showing relations to other thoracic organs (Ingals).

The average frequency of the heart's beat, or the pulse, is 72 times a minute. It is increased by exercise; it is quicker in the standing than in the sitting posture. It is quickened by meals, and, on the whole, it is quicker in the evening than in the early morning hours. Independent of muscular exertion, it is quickened by great altitudes. It is said to be quicker in summer than in winter. Its rate is profoundly influenced by mental conditions.

The whole of the blood of the body passes through the heart in 32 beats—that is, in less than half a minute. The greatest part of this time is spent in the capillaries, There the tissues are obtaining their fresh supplies of food and discharging their waste matter into it.

The heart, great blood-vessels, and the lungs are placed in the air-tight cavity of the thorax, and are subjected to the pumping action of the respiratory movements. The inspiratory muscles elevate the ribs, at the same time that

Fig. 9.—Relation of heart and great vessels to the wall of the thorax. The collapsed lungs are drawn slightly aside (after Heath).

the diaphragm, by its contraction, pushes the contents of the abdomen downward. The cavity of the chest, so enlarged, causes the pressure around the heart and the great blood-vessels within the chest to be less than that on the blood-vessels outside the chest; hence, during each inspiration the venous blood is sucked back into the right side of the heart.

The tissues deprive the blood of its oxygen, so that which flows back to the heart in the veins is blue. The right

heart then sends this blue blood to the lungs, that it may get rid of its carbonic acid, which is not only not needed, but is actually injurious to the body, and to receive a fresh supply of oxygen, which has been carried into the lungs in breathing.

The *blood* is the great medium of exchange between all parts of the body. It is, at the same time, the nourisher and the scavenger of all the tissues. After the food has been liquefied and converted into new substances in the digestive system it is poured into the blood. From the blood all the tissues draw material to renew their own worn-out parts and other material which they store up

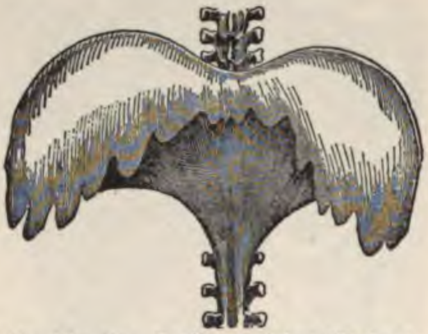

Fig. 10.—The diaphragm (after Kitchen).

as latent force, which, when it unites with the oxygen of the blood, becomes active force, such as heat and motion.

The blood holds in suspension a vast number of minute cells or corpuscles; the red corpuscles give its color to the blood, and are the oxygen carriers, while the white are the phagocytes or the protective agents of the body against disease.

The blood constitutes about one-thirteenth of the body weight. Of this, one-fourth is distributed to the heart, lungs, and great blood-vessels, one-fourth to the liver, one-fourth to the skeletal muscles, and the remainder to other organs.

In order that the blood may be a satisfactory medium of exchange between all the tissues of the body two things are necessary—first, there must be through all parts of the body a flow of blood of a certain rapidity and general constancy; and, second, this flow must be susceptible of general and local modifications.

The **lungs** are the essential organs of respiration or ventilators of the body. They are two in number, separated from each other by the heart, are placed in a semi-distended state in the air-tight thorax, which we have seen they, together with the heart and great blood-vessels, completely fill. The lungs ultimately consist of air-cells, surrounded by dense plexuses of capillaries and nerves. The air-cells communicate with the exterior through the bronchial tubes, trachea, larynx, throat, and nose.

The larynx is the organ of voice. It is situated between the trachea and the base of the tongue, at the upper and back part of the neck, where it forms a considerable projection in the middle line, called Adam's apple.

The trachea is a cylindric tube, which extends from the larynx downward about 4½ inches, when it divides into the right and left bronchial tubes. The bronchial tubes, on entering the lungs, divide and subdivide, until finally they terminate in a lobule which is composed of air-cells and intercellular passages.

In inspiration the cavity of the thorax is enlarged by an active contraction of the muscles, in consequence of which the pressure of air within the lungs becomes less than that of the air outside of the body, and this difference of pressure causes a rush of air through the trachea into the lungs, until an equilibrium of pressure is established between the outside air and that within the lungs. This constitutes *inspiration*. Upon the relaxation of the respiratory muscles, the elasticity of the chest-walls and lungs, aided perhaps, to some extent, by the contraction of certain muscles, causes the chest to return to its original size. In consequence of this, the pressure within the

becomes greater than that outside, and the air of the trachea, until the equilibrium is once lished—*expiration.*

quiet respiration all parts of the lungs are not panded; it is chiefly the apices of the lungs, p into the region of the neck, and the central he lungs, which undergo the least change of This lack of a thorough distention and aëration art of the lungs is a cause of weakness of the vell as of the entire body, for it is precisely of the lungs which are the least active that are to become the seat of tuberculosis.

d inspiration the cavity of the thorax is in- m 2 to 3 inches, partly by the elevation of the artly by the descent of the diaphragm, due to ction of its muscular fibers. In contracting, agm presses upon the abdominal viscera, push- lownward about 3 inches, so that a projection id abdominal walls occurs. The movements of agm are less extensive in women than in men.

The vital importance of the rôle which oxygen plays in the health and life of the individual may be better understood from the facts that about 10,000 liters of air are breathed daily, which makes the amount of food and drink consumed daily seem almost infinitesimal, and, important as the quality of the food is, the quality of the air is much more so, and, finally, that one can live for some days without either food or drink, but dies in a few minutes if the supply of air is cut off.

Secretion of the Lungs.—Like the lips and mouth, the lungs are invested on their free inner surface by a delicate mucous membrane, which constantly secretes a clear viscous fluid, the mucus. The lungs, therefore, like the nose, are always moist, and just as the nose is cleared by blowing it, so the lungs are cleared by hawking or coughing. A sense of discomfort or a feeling of irritation of the windpipe induces a deep inspiration, followed by an explosive expiration, which quickly brings up the mucus, so that it can be expectorated. The only difference between the mucus of the lungs and that of other organs is that the former is mixed with air and has, therefore, a frothy appearance.

The secretion of the lungs naturally flows down and accumulates, until it is voluntarily brought up and expelled. Any one with a cold on the chest, or who is subject to catarrh, will notice that, on moving about in the morning in making the toilet, especially on raising the arms to dress the hair, expectoration is greatly facilitated, and that this is followed by a feeling of clearing out of the throat and lungs.

Because of the great aid given to the lungs in clearing them of mucus, moderate exercise in the open air is a much better treatment of an ordinary cold than a prolonged stay in bed. And for the same reason, in the treatment of lung troubles, so soon as the temperature of the patient is down to normal, and her strength makes it safe to allow her to move about, the recovery of the patient is hastened by getting up and moving about the house.

of the Lungs and Its Relation to the ealth.—Two conditions are essential for the n of the health and prevention of diseases of good chest and lung development, and a con-ply of fresh air for the proper ventilation of

e-third of the whole volume of blood is ılating in the lungs, and each corpuscle passes em 8000 times in the twenty-four hours. In s, the lungs are the vitualizing stations of the which unceasingly go hurrying by. If these id-laden corpuscles arrive in the lungs, and do e requisite amount of oxygen awaiting them, to the tissues, carrying part of their carbonic to them instead of a fresh supply of oxygen, issues are weakened instead of being nourished, orpuscles themselves suffer from lack of proper t and deteriorate in form and color. Imper-tion of the lungs is the most frequent cause of hinness of the blood.

portant part in expiration, hence, in emptying the lungs of their impurities. Under normal conditions the pressure in the abdominal cavity is greater than that of the atmosphere; hence in the elastic recoil following inspiration, the abdominal viscera constitute a buffer, so to speak, and drive the diaphragm upward.

The chief causes of flabby abdominal muscles, with its consequent low intra-abdominal pressure, are a sedentary life, the wearing of corsets which prevent the free play of the abdominal muscles, and the overdistention of the abdominal walls by repeated pregnancics and by the accumulations of fat.

As a result of lax abdominal walls, there is very frequently an enteroptosis or a falling of the abdominal contents far below their normal position; this includes the liver, spleen, pancreas, the intestines and stomach, and is the most frequent cause of floating kidney.

Further, the accelerating influence of the diaphragmatic movements on the circulation is seriously interfered with.

The Importance of Good Chest Development.—The least chest development of the adult woman—that is, the underarm girth around the chest—consistent with good health is 28 inches, and this girth must be enlarged 3 inches on forced inspiration. In ordinary respiration the waist expansion should be from ½ to 1 inch, while during muscular activity it should be from 1½ to 3 or 4 inches.

In women the movements of the upper part of the chest are very conspicuous, the breast rising and falling with every respiration; whereas, in children and in men the movements are almost wholly confined to the lower part of the chest, and are called diaphragmatic, in contradistinction to those seen in women, which are called thoracic. It is now the opinion of many observers in this country and in Europe that the habit of thoracic breathing in women has been brought about by constricting the waist and the lower ribs. Observations made among the Indians and Chinese women show that the abdominal is

ype of breathing, *and* civilized women who
rset had relatively good abdominal breathing.
at a thoracic type of breathing can be pro-
an by putting him in a corset.
acity is, as we have seen, the term employed
he amount of air that can be expired after the
sible inspiration. The amount for persons
eight has been estimated as 174 cubic inches,
rease of 8 cubic inches for every inch in height
The relation between height and vital capac-
remarkable, since height is chiefly determined
th of the legs, and not by the size of the trunk
This is due to the fact that mobility of the
ses with stature.
city of the chest is determined by the spirom-
erson who can only blow, say from 180 to
nches, has a good pair of lungs, while, on the
, an ability to blow only 100, even where per-
l auscultation had revealed nothing, is sus-

The Chemical Properties of Air.—It is of more vital importance that the air which we breathe should be pure than the food which we eat should be, although the latter is universally conceded to be a matter of prime importance. The reason is that the poisons in the air, inspired by the lungs, pass directly into the blood, whereas, taken into the stomach, the action is much slower, and there is at least the possibility of their passing through the digestive tract unassimilated.

The olfactory nerves are the normal guides as to the purity of the air, and, if they have not been dulled by long usage in breathing impure air, they are extremely sensitive to impurities in the atmosphere.

Country Air.—In the open air there is a constant, even though insensible, movement of the currents of air; the result is a constant renewal or ventilation of the air. There is, in addition, the evaporation from brooks, rivers, lakes, the dew and rain, which aid in cleansing the air from dust; the peculiar freshness of the air in the country after a heavy fall of rain is familiar to all.

The "bouquet" of the air, most noticeable and delightful in the early morning, especially in the spring of the year, is due to the fragrance given off from the flowers, plants, and trees, and imparts a feeling of exhilaration and a sense of the joy of living.

Sunshine increases the respiratory movements.

Wind clears the air of impurities, and is only harmful when it carries dust with it, or when it is so strong that it impedes the respiration or bodily movements. Very weak persons get out of breath easily when battling against the wind.

Town Air.—Even the outdoor air of towns has its full quota of oxygen,—21 per cent.,—and so is healthier than indoor air. The carbonic acid in the air varies from 0.2 to 0.6 per cent. Among the impurities of the air are smoke, fog, and dust.

Dust and Its Relation to Disease.—Dust, consisting of particles of all kinds of organic and inorganic matter,

e of indoor as well as outdoor life. That the
es is the intolerable nuisance and menace to
h that it is, is due to the filthy condition of

fic cause of tuberculosis is the tubercle bacil-
lering the prevalence of the custom of spitting
ments, streets, floors of public conveyances,
halls, that the dust from the streets is carried
uses on the shoes and the trailing skirts of
self-evident that anything which stirs up the
eeping, stamping on the floor with the feet,
l on the streets strong currents of air and high
most serious menace to the health and lives
unity.

n to the fact that dust is the great carrier of
bacillus, the particles of dust cause a direct
the mucous membranes lining the nose, throat,
bronchial tubes.

is an important factor in the causation of
e inferred from the facts that they are more

The bacilli are not only the cause of the acute infections, but also of chronic bronchitis.

The bacterial flora usually present in the throat and the respiratory passages is rich and varied. So long as the mucous membrane lining these passages remains in a healthy condition, an unfavorable condition is offered for their growth and development and these microörganisms are harmless. But just so soon as the general vitality is lowered, or there is an impairment of the normal condition of the epithelium lining the respiratory tract, a culture-medium is provided in which these germs flourish and grow. Anything which will cause an irritation or congestion of the mucous membrane of the throat and bronchial tubes furnishes the necessary conditions for the infection to take place. The germs themselves excite an acute inflammation, and the inflammation extends from the head or throat to the bronchial tubes, through the spread of the infective agent along the respiratory tract.

Ventilation.—Very few people in cities spend more than one hour a day in the open air, which means that they are housed up for the other twenty-three hours, so that no pains should be spared to bring up the quality of the indoor air to approximate as nearly as possible that of the outdoor air. The air of houses contains many more microbes than that of the street.

For dwelling-houses 3000 cubic feet of fresh air is needed every hour. It is said that in the country the only bad air is in farmers' houses, whence it has no chance to escape.

Direct sunlight kills the tubercle bacillus in thin layers of sputum in five or six hours, and diffused sunlight in several days, and proper ventilation greatly facilitates this bactericidal action. A large cubic space is of little avail if the ventilation is inadequate. The windows should be at least one-seventh of the floor space.

The air of the house must be fresh, pure, and cool, to allow proper ventilation of the lungs and skin. Colds are prevalent in winter, because that is the season when people are housed up and breathe impure air.

nonest causes of impurities of the air in houses
ired air and the transudation of the skin; the
of the combustion of lights or unconsumed
ne from the burner when lit, if the pressure is
, or the rubber fittings may retain the gas;
oke; the effluvia of simple uncleanliness of
persons; and the products of the fluid or solid
ined in the room. In addition, there may be
itions which allow the impure air to flow into
from the basement or cellar of a house, from
trapped soil and waste-pipes, or from other
utside of the house.
tion the air is vitiated by a decrease in the
xygen and an increase in the amount of car-
the expired air contains about 4 or 5 per cent.
and about that amount more of carbonic acid
spired air. It has been estimated that an
akes into her lungs about 500 cubic inches of
ute and exhales the same amount of vitiated
xpired air is of a higher temperature, and is

The physiologic effects of breathing vitiated air are that, owing to the impurities of the air, the respirations become quicker and shallower, the heart's action more rapid and feeble; there is a more or less irritation of the mucous membranes lining the nose, throat, and larynx. In extreme cases, where many people are crowded together and the ventilation is totally inadequate, the air often becomes so impure as to cause headache, lassitude, nausea, and fainting.

The long-continued action of such impurities on the olfactory nerves may ultimately induce, through the central nervous system, alterations in the respiration, circulation, and nutrition. When moderately vitiated air is breathed more or less continuously, the individual becomes pale and loses her appetite; after a time there is a decline in the muscular strength and animal spirits. The aëration and nutrition of the blood is interfered with, and the general tone of the system falls below par.

It has further been maintained that metabolism is hindered by much-breathed atmosphere. In addition to the ordinary symptoms of discomfort, the long occupancy of so-called stuffy rooms so lowers the resistance as to be conducive to the contraction of colds and even to more serious infections.

People in this lowered condition of health, which is very common among those who spend the greater part of the day indoors, in offices, houses, schools, factories, and workrooms, offer much less resistance to attacks of acute diseases than do people who lead an outdoor life.

In considering the ventilation of a house, the purity of the air, the temperature, and the dryness of the air must all be considered.

The test now generally accepted as the standard of purity of the air is not the chemical one of the estimation of the amount of carbonic acid contained in the air of a closed space, but that, on entering a room or closed space from the outside fresh air, no sense of impurity or closeness should be noticable.

alled natural ventilation of houses, which
through the porosity of the walls, the cracks
loors and windows, is generally too inconsider-
aken into account.
uses are heated by furnaces, a certain amount
on is furnished by this means, but the air is
s so pure as the air of a house heated by hot air
pes. In the latter case, the greatest drawback
ss of the air.
r contained in an inhabited room cannot be
as the outside air, the object of ventilation is,
ssion of the pure external air, so to minimize
es that the air respired may not be detrimental

effective means for the ventilation of houses
ents is the throwing wide open all doors and
e windows must be opened at both top and
he hot impure air rises and the cold air falls
The length of time which the house should
will depend on the outside temperature and

mizes the amount of coal consumed, besides increasing the vigor of the body.

The temperature of the house will depend on the occupation, age, and health of the inhabitants. With a sedentary occupation, a temperature of from 64° to 70° F. is the most suitable. The temperature of the bedroom at night should not be allowed to fall below 50° F. Every room in the house should be furnished with a thermometer.

The Injurious Effects of Overheated Air.—A rise of temperature in the surrounding air diminishes the amount of oxygen consumed and the amount of carbon dioxid discharged; a fall of temperature has the opposite effect. In addition, this overheated air forms a hot jacket about the body, which prevents the radiation of heat necessary to keep the body in a healthy condition.

For the same reason, when out-of-doors, furs should not be worn close up around the neck, and fur coats should only be worn in the extremely cold weather. Paper and rubber worn about the body act in the same way, by preventing the radiation of heat and moisture—practically steam jackets are formed; the skin is rendered very sensitive and susceptible of chilling on the slightest fall of temperature.

The Proper Degree of Moisture of the Air of the House.—The air below the freezing-point is deprived of much of its moisture; brought into the house, and raised from 70° to 80° F., or drawn into the nostrils and raised to 98° F., it must take up its quota of moisture. This moisture must, therefore, be provided in the air of the house. In the case of houses heated by furnaces, some moisture is furnished by the water-pans of the furnace; but in the case of heating by hot air and steam pipes, there is less circulation of air, the air is very much drier, and generally of a very much higher temperature. A satisfactory method of furnishing these houses with the proper degree of moisture has not yet been invented.

One is only comfortable in a dry air when it is of a low temperature. When the dry air becomes heated, there is

sture given off by the mucous membranes, ses a feeling of dryness and irritation in the t, and larynx; there may also be a sensation ess of the chest, and, at the same time, the feels chilly.

constantly breathing abnormally dry air lower g power of the respiratory mucous membranes e very susceptible of taking cold.

e degree of moisture of the air of a house is portant as its temperature, every room should ed with a hygrometer, which should register 70 per cent. of moisture.

ntilation of Bed-rooms.—The importance per ventilation of the sleeping-room will be he fact that two-thirds of the oxygen absorbed nty-four hours is absorbed between 6 o'clock ning and 6 o'clock in the morning; and on f the air of the bed-room will depend greatly y of the individual. During sleep inspiration n-twelfths of the respiratory period, while at

fortably on the side, with the face almost at the edge of the bed; in this way the formation of a stagnant pool of exhaled air about the face is prevented, which would otherwise be rebreathed, and greatly increase the feeling of discomfort and malaise.

On retiring at night the clothes worn during the day should be spread out over chairs to become thoroughly ventilated, instead of being hung up in a closed press or closet. From a sanitary point of view, it is essential that every article of clothing worn during the day should be removed at night. Both clothes and body need ventilation.

In the morning the clothes should all be taken off the bed, and they, as well as the night-clothes, should be spread out to be aired during the ventilation of the room. The windows are thrown wide open when one goes to breakfast.

The Care of the Nose, Throat, and Ears.—It will be most profitable to consider the care of the nose, throat, and ears together, since the mucous membrane lining these cavities is continuous, and so there is always great danger of an inflammation of one extending to the others.

It has been calculated that about one-third of our adult population are notably deaf in one or both ears. In the majority of cases deafness is the result of colds and throat troubles, and much can be done to prevent its occurrence.

The nose communicates through the nasal fossæ with the nasopharynx, and the mucous membrane lining the nose is continuous with that lining the throat.

The nose performs four important functions—it serves as a passageway for the air in breathing, and it warms, moistens, and filters the inspired air; it is the organ of smell; it aids in phonation; and it affords ventilation to the ears and accessory sinuses. But by far its most important function is the rôle which the nose plays in respiration. To supply the large amount of water necessary to moisten the inspired air, it has been calculated

10

one pint of water must be secreted by the part of this amount of moisture is furnished rs. Mouth-breathing always causes dryness t.

tion of the air is accomplished first through f the hairs at the external margin of the nose, r the entrance of large particles, and, second, erence of small particles to the moist surface cate passages of the nose and nasopharynx. es are expelled with the dust; in addition to se probably has the power of destroying any ough the action of its germicidal mucus.

n of the Nasal Passages.—In adults the com-les of obstruction are the bending of the nasal one side, or by a thickening of the septum ne nostril may be completely closed up. The ay also be due to the swelling of the mucous or the presence of polypi.

en the most common form of obstruction of by the adenoids and the enlargement of the

Between these pillars, on either side, is an almond-shaped body called the tonsil. In health the tonsil should not protrude beyond the anterior pillar.

Causes of Diseases of the Nose and Throat.—Exposure to wet and cold, when insufficiently clad, or, even worse, sitting still with damp skirts or shoes on. A still more potent factor than exposure to cold is the relative degree of humidity of the atmosphere; great humidity is frequently accompanied by epidemics of influenza. Exposure to very high winds; sudden changes of temperature; the very dry air and the overheating of houses; insufficient covering at night; the inhalation of irritating vapors and finely divided mechanical irritants. Also, gastro-intestinal affections and uric acid.

Chronic enlargement of the tonsils predisposes to tonsillitis and to all the infective and contagious throat diseases. In addition, the breath is apt to be fetid, and swallowing the mucus, germs, and toxins has a deleterious effect on the stomach and general health. Mouth-breathing and anemia often follow, and there is an increased liability to inflammation of the eyes.

The Importance of a Healthy Condition of the Throat and Nose.—The nose and throat are the portals of entrance to the bronchial tubes and lungs, and it depends on the condition of their mucous membranes whether the germs of disease will find lodgment here and be carried down into the bronchial tubes and lungs, or whether they will be expelled with the mucus.

Any irritant which destroys the vitality of the epithelium covering the mucosa, or a local congestion which interferes with the nutrition, circulation, and secretions of the part, offers favorable conditions for the culture of bacteria normally present. Also, anything which will cause a lowering of the general health, and thereby lessen tissue resistance, acts as a predisposing cause to local inflammation, while the germs themselves excite inflammation by their active growth *in loco.*

From these facts will also be seen the importance of

hort, as rapidly as possible, any congestion or
y troubles of the nose and throat.

of Nasal Catarrh and Sore Throat.—First in
comes attention to the general health. Under
e considered the clothing, food, ventilation,
.

ing should be light, yet sufficiently warm to
ion against the cold and winds. Heavy shoes
soles are necessary to protect the feet, and it
ich the matter of getting wet as it is of sitting
damp clothing on.

phere filled with dust in sweeping should not
in any well-kept house.

*eatment for the Prevention and Cure of Mild
asal Catarrh and Sore Throat.*—The treatment
y the same. The toilet of the nose and throat
nade at least as often, and at the same time,
he teeth; certainly, the first thing on getting
norning and again before dressing for dinner.
oard cities and towns, at least, there is a very

The liquids used must be bland and unirritating, and only enough should be used at one time to cleanse the parts. There are on the market excellent alkaline and antiseptic tablets; one tablet should be dissolved in a spray-bottle not quite full of water. This solution keeps in perfect condition, and is always ready for use.

A solution of boric acid, in the proportion of two teaspoonfuls of boric acid to one pint of water, may also be used.

If the nose and throat are inflamed, this so-called water spray should be followed by an oil spray, which will be found to be most soothing and healing. A separate apparatus for this will be necessary, as an oily solution would clog an ordinary water-spray, but the principle of the spray is the same, and it is used in the same way. The following is an excellent formula: Take of menthol and carbolic acid each two grains; of eucalyptol, six drops; and of albolene, two ounces. Mix well, and fill the spray-bottle one-third full; it is to be used in the full strength. Use only enough of this spray to moisten the nose and throat; by inhaling simultaneously with squeezing the bulb, the very fine spray is carried into the larynx, and so is very useful when there is an irritation of that organ, as shown by hoarseness. If there is only a slight irritation of the parts, the use of the spray twice daily will be sufficient; the last time should be just before retiring. On windy days it will be a great protection to the mucous membrane of the throat to use it just before going out-of-doors, on the throat only. If the inflammation is severe, the spray may be used as often as every two hours. This prescription should be put up by a good druggist.

Ear specialists condemn all nasal *douches* as dangerous, on account of the possibility of the water being forced into the Eustachian tubes.

General Treatment.—First of all, the system must be toned up by the systematic use of cold baths, adapted to each particular case, tonics, iron, and cod-liver oil. It is a grave mistake to allow these cases to become

they may be the forerunners of influenza
neral tuberculosis. They need prompt and
tment, which the physician alone is capable

—The ear is divided into three parts—the
the middle ear or tympanum, and the internal
inth. The internal ear is the essential part
of hearing in which the auditory nerve ends.
is very complicated. The external ear is
om the middle ear by the tympanic mem-
mhead. This is a thin, small, membranous
is stretched tautly across the junction of
avities, and vibrates inward and outward
m. The external ear collects and conducts
sound to the tympanum.
e ear, or tympanum, is an irregular cavity,
in the bone. It is traversed by a chain of
es, which connect the drumhead with the
and serves to convey vibrations of sound to
dle ear, or drum cavity, is filled with air,

tubes become closed, deafness, dizziness, and subjective noises will result.

The middle ear is the seat of about two-thirds of all aural troubles, and, since much of this could be prevented, this becomes a matter of great practical importance.

Causes of Impairment of Hearing.—The majority of the affections of the middle ear originate from extensions of catarrhal inflammations, from the nose and throat, through the Eustachian tubes. In children adenoids are the most frequent cause of deafness. The so-called hereditary deafness is probably due to an inherited configuration of the septum of the nose, a bending of the septum to one side, or a tendency to catarrhal affections of its mucous membranes.

Every cold in the head tends to mechanically involve the ears, and, while recovery may seem complete, there is likely to be some unrelieved trouble which insidiously but steadily increases—first one ear, and then the other, shows signs of defective hearing. If only one ear is involved, the condition may progress seriously before the patient is aware of the trouble.

Preventive Measures Against Deafness.—From what has been said, it naturally follows that the preventive measures must be chiefly those already given against taking cold. If one does take cold, instead of leaving it to run its course, as is too often done, proper therapeutic measures should be at once adopted to bring as speedy a cure as possible.

Impacted Ear-wax and its Removal.—A healthy ear should never show more than enough wax to render the hairs within soft, and the individual should be unconscious of the wax coming away. Wax does not collect in a healthy ear. When it does occur, there is a stopped-up feeling in the ears, due to the occlusion of the meatus by wax.

The only procedure that is safe to follow in order to remove the wax from the ear is to gently douche the ear with warm water, at a temperature from 105° to 110° F.

not suffice, a physician must be consulted, as remove the wax after it has become impacted is and futile except in skilled hands.

The best thing for the relief of earache is application of heat by means of a hot-water does not give relief, the ear may be douched vater. Earache can often be prevented, by t to it, by placing a very small piece of tton in the ear before going out in very high utomobiling.

nts to Normal Respiration.—These are, for , acquired through improper habits of posture, f muscular and chest development. Other to respiration are a deviation of the septum to one side, marked curvature of the spine, ies of the chest which may be the results of

of the spine is frequently the result of mus-ss, combined with faulty position at the desk. ng must be sufficiently loose to admit of the

The Correct Attitude at the Desk.—The chair should be of such a height that the woman may rest her feet firmly and easily on the floor or upon a foot-rest, the seat being deep enough from before backward to accommodate about three-fourths of the length of the thighs, while the back of the chair should be so curved as to support the spine easily in its natural curves, both at the waist and at the level of the shoulder-blades.

The chair and desk should be sufficiently close together so that the student may sit erect to read from books, since leaning forward at the desk causes round shoulders, flat chest, and short-sightedness. When the desk and chair are properly arranged, two-thirds of the forearm can be rested upon the desk without raising the shoulders.

In reading, the distance of the book from the eyes should be twelve inches, and the book-rest should be inclined, sloping downward toward the reader, at about an angle of 85 degrees.

If the woman has any great amount of writing to do, she should learn to use a typewriter. In using this machine she not only writes very much more rapidly and easily, but the position of the body is much more erect than that assumed when using the pen, and it is not nearly so fatiguing to the muscles of the hands and arms.

All closely confining sedentary occupations, as writing, sewing, etc., should be frequently interrupted to move about for a few minutes, rest the eyes, and take a few deep breathing exercises before an open window; this is necessary for the eyes as well as for the ventilation of the lungs.

Ventilation of the Lungs and Breathing Exercises.—Forced respiration is essential to completely change the air in the lungs, to maintain the elasticity of the lung tissue, and to expand the chest in every direction. Only in this way can a thorough ventilation of the lungs take place; a full supply of oxygen is taken in, which stirs up, disinfects, and cools the stagnant residual air, and

ration expels the respiratory excretions. One
uent causes of foul breath is lack of ventila-
lungs, so that the expired air becomes laden
ities.

l breathing the current of air which passes in
the lungs travels through the nose, not the
ne ingoing air, by exposure to the vascular
embrane of the narrow and winding nasal
warmed and moistened, and at the same time
is protected from the desiccating effects of the
nroad of comparatively dry air.

s of respiratory exercises the mobility of the
be greatly augmented; there is an increased
f the ribs and sternum, as well as loosening
acic joints, which may have become stiff, and
ses also lead to a development of the respiratory

nanner only can the frame work of the chest
oroughly inflated from within, and thus all

of blood in the splanchnic veins, so that, particularly when there is any tendency to difficulty with the breathing at night, the trouble is greatly lessened by filling the lungs with pure air just before retiring.

It is necessary, first of all, to learn the art of breathing, to be able to dissociate the clavicular, the costal, and the diaphragmatic. By clavicular breathing is meant the raising of the collar-bone and shoulders as high as possible by means of a slow but deep inspiration—this expands the apices of the lungs; costal breathing is the throwing out and expanding the chest to its utmost capacity, and so enlarging the chest in its transverse and anteroposterior diameters; diaphragmatic breathing is the depression of the diaphragm and the protrusion of the abdomen without raising the lower ribs. The last is the most readily learned in the supine position; the bed supports the weight of the body, so that the individual is able to concentrate her entire attention on fixing the bony thorax, depressing the diaphragm, and protruding the abdomen at every inspiration and retracting it to the utmost with every expiration. This, of course, develops and gives tone to the abdominal muscles.

When the woman has conquered these first principles of respiration, she is ready to put them into practice in the standing posture. They should be learned before a mirror, and after that taken before an open window. The hands should be placed on the hips; first elevating the collar-bones and the shoulders to the utmost, while still holding the breath, she expands the chest, always breathing in from above downward, and, lastly, the diaphragm is depressed. With the lungs thus expanded to their utmost capacity, the breath is held as long as possible, then the lungs are emptied by an abrupt and forced expiration.

These exercises should be repeated at first ten times, gradually increasing to thirty times. It is well to take one or two ordinary respirations between the forced ones.

found that, as these exercises proceed and e filled with purer air, the breath can be held period of time, and that with practice the ime that the breath can be held is greatly it should be held for half a minute. Public ngers, and divers are all skilful in this respect. ese simple breathing exercises have been breathing exercises can be combined with ses, which have as their aim the development les of the chest.

aloud, singing, talking, laughing, are all good developing the capacity of the lungs.

of Chronic Bronchitis by Deep-breathing —The upper part of the body must be nude ercises taken before a mirror, so that the watch the movements of the chest and ee that all the hollows of the chest are filled forced inspiration, and that the muscles of en are properly retracted. For the average last will be the most difficult; in beginning

and they can only be dislodged from the mucous membrane by forced abdominal expiration and the ascent of the diaphragm. This causes a cough which expels the mucus, and forcible abdominal expiration and cough are the only means of drainage of the lower and deep-seated parts of the lungs. Further, in forced respiration the muscle tissue of the bronchial tubes contracts, which certainly does not take place in ordinary respiration, but, on the contrary, this tissue atrophies.

Other beneficial results from forced respiration are increased oxygenation, improved nutrition, changes of a mechanical nature, ventilation, and disinfection of the lungs, massage of the lungs and pleura, and drainage.

No other method of treatment is so successful in the cure of chronic bronchitis not dependent on disease of the nose and throat. In from two to six weeks of treatment, in which there is a profuse discharge of mucus, it will be found that the bronchial tubes have cleared up, provided that the patient is supplied with an abundant supply of fresh air day and night. Methodically practised, deep breathing is not only the surest cure, but also the safest stimulating expectorant.

Relation of Colds and Influenza to Pneumonia and Tuberculosis and their Prevention.—We have already seen that bacilli are not only the cause of acute infections, but also of chronic bronchitis, and that this was especially true of the bacillus of influenza and the pneumococcus of pneumonia.

It is well known that influenza is an infectious disease, which rapidly spreads through the family and the community, but it is not so well known that the so-called "common colds," ordinary sore throat, and tonsillitis are also highly contagious. The infection is carried from one person to another by direct contagion; the air is being constantly sprayed with the germs of disease in talking, laughing, sneezing, and coughing. In coughing and sneezing it is not sufficient to hold the hand before the mouth—a handkerchief must be used for this purpose.

among the most frequent of the so-called
nts in this country. The causes are the over-
he houses, the great dryness of the air, badly
houses and public assembly rooms, which
le very susceptible to the great variations in
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is, or *the prevention of colds*, combine all those
hich promote the general tone of the system,
said to embrace all the elements of personal
ood digestion and proper nourishment of
ith suitable food; the proper ventilation of
ublic buildings and conveyances, for in these
iblic are brought into very close contact with
men.

phylaxis would consist in the toilet of the
roat—the removing of adenoids and enlarged

idual must remember that she can reinfect
this reason, an abundant supply of hand-
ust be used; they should be placed in a

should be taken the following morning to tone up the system. Turkish baths are also useful in breaking up colds; again, the precaution must be taken to avoid chilling on leaving the bath.

The following tablet is a very simple and very efficacious remedy for breaking up a cold in the early stages: Take of powdered camphor $\frac{1}{4}$ gr.; of the sulphate of quinin $\frac{1}{4}$ gr.; and of the fluidextract of belladonna root $\frac{1}{8}$ minim. This should be well mixed, and made up into one tablet or a capsule. One tablet is taken every half-hour, until four doses have been taken; after that one tablet every three hours, until the running of the nose has ceased, which generally occurs within twenty-four hours. If there is not marked improvement at the end of this time, or if there is any fever, a physician should be consulted at once.

Quinin, when given alone to abort colds, must be given in sufficiently large doses to produce cinchonism, the subjective symptom of which is a slight deafness or ringing of the ears. The natural tendency of cold is to cause inflammation of the middle ear, and since the use of quinin in large doses causes a congestion, and so predisposes to inflammation of the middle ear, its use should be avoided.

The great amount of illness and mortality from pneumonia during and following epidemics of influenza is too familiar to the public to need more than mentioning. The patient is so rapidly and extremely prostrated by the attack of influenza as to be susceptible to the ready action of the pneumococcus, which, as we have seen, is ever present, and the extension of the inflammation from the fine bronchial tubes to the air-cells of the lungs rapidly takes place. In the exhausted condition of the patient she is not able to resist this invasion, the heart is already weakened, and death frequently rapidly ensues as the immediate result of heart failure.

The Prevention of Tuberculosis.—The tubercle bacillus is practically ubiquitous, and the prevalence of

is universal. Hence it is imperative to sistance of the individual in every way pos- l as to limit the spread of the infection. This employment of all the resources of public and giene, public and private sanitation, and the f the public in how the disease is disseminated, spread may be prevented; also the teaching vidual, her duty to the family and society, as erself, in order not to spread the contagion.

sis attacks the crippled and poorly developed surely as it shuns the one which is fully ex- l in constant and active service. Numerous s have established the existence of a constant en tuberculosis of the lungs and deficient sion.

e doctrine has been growing among the laity ild's likes and dislikes should determine what uld eat. Thus a finical taste is cultivated of proper nourishment follows, and it is this class of people which forms a large percentage

classes is a powerful predisposing cause to intemperance and tuberculosis.

Influenza is a frequent and important agent in bringing to light latent tuberculosis, and must be classed as an important exciting if not predisposing cause. Low, damp climates predispose to the infection by lowering the vitality. Tuberculosis is more prevalent in cities than in rural communities, due to the manner of housing and the character of the occupation.

Summary of the Present Views of Infection.—The doctrine of inherited and acquired susceptibility still holds sway; next, that all infants are susceptible, and that susceptibility lessens with increase in age; that adults are comparatively insusceptible when free from general and local lowered resistance and repeated and prolonged exposure.

As to the source of infection, the consensus of opinion and ascertained facts point to the sputum as of overwhelming importance; cow's milk is an important factor; the food may be infected directly by coughing, or the dirt and dust from the floor and hands; the fingers and many other objects that find their way into the child's mouth are sources of danger. To adults, both dust and moist droplets are more often the source of infection than infected food.

Expectoration.—Careless expectoration is the chief source of infection. Laws should be passed and enforced prohibiting the expectoration on pavements, stairways, in all public conveyances, and all public places.

The danger of infection from tuberculous house servants has not been sufficiently appreciated. A chronic cough in the case of a servant should be at once investigated by the family physician. Servants should be taught the necessity for washing the hands before touching the food or cooking utensils. The condition of their rooms, clothing, bathing, and other personal habits should be closely investigated, and personal cleanliness should be demanded as a *sine qua non* for obtaining or keeping a situation.

a well-known fact that tuberculosis can be
m the occupation of houses and rooms
upied by tuberculosis patients, it has been
t a clean bill of health should be demanded
r of the house before renting it; that is,
from the Board of Health, that no case of
s existed in the house, or that it has been
nfected since that time. If such a move-
e popular, landlords would be obliged to
bills of health in self-defense. Since the
ealth demand the reporting of all cases of
this scheme is by no means impracticable or

cle bacillus is not destroyed by any degree
oth light and sunlight are distinctly injurious
teria. The lowest fatal temperature to the
llus is 131° F. of moist heat, acting for a
hours. The thermal death-point of tubercle
k is of great practical importance, and many
have been made which have determined that

of water are added, and then the sulphuric acid is poured slowly in. The lime is placed in a china or earthenware wash-basin on the floor upon newspapers; all water is removed from the room. All drawers and cupboards opened; the mattresses stood on end; and the mixture poured quickly upon the lime, when the door is sealed. The sulphuric acid may be packed in a tin bucket containing the lime, and, with the formalin in a separate bottle, may be used by any person of ordinary intelligence. The room should remain closed from twelve to eighteen hours. It must not be lost sight of that after disinfection by means of formalin a thorough cleansing is imperative. A room which has been thoroughly cleaned and carbolized is safer than a room which has been disinfected with formalin and not properly cleaned.

After death or removal the entire place should be renovated. Besides disinfection and scrubbing the painted woodwork with a solution of hot soda water, the walls should be repainted or repapered, and the woodword repainted.

Rugs, bedding, pillows, and clothing should be disinfected by hanging up in the room while it is undergoing disinfection. Books and all articles of small value should be burned. All soiled linen should be boiled.

The Kidneys and their Function.—The kidneys are the secretory organs of the urine; they are two in number, and are the largest tubular glands in the body. They are deeply seated in the lumbar region, lying one on each side of the vertebral column; the kidneys extend from the eleventh rib nearly to the crest of the pelvis. They are usually embedded in a considerable quantity of fat, which is the chief factor in holding them in position, aided to some extent by the large blood-vessels with which they are connected. The kidneys are oblong bodies and measure about 4 inches in length, 2½ inches in breadth, and over 1 inch in thickness. Their weight is about 4½ ounces.

As an excretory organ the kidney probably stands

second to the alimentary canal; it surpasses in importance the skin, whose total excretion of water it equals. The abnormal substances appearing in the urine are often not the products of disease of the kidneys, but of some other organ or system.

The kidneys excrete and put the finishing touches upon the urinary fluid; they act at the end of the metabolic course, both as active and as passive agents. While to some extent the kidneys are mechanical contrivances, mere filters, so to speak, they are to a far greater degree active, specific glands. The renal epithelium has the power of synthesis, and builds up complex substances that are not apparent as such in the blood or lymph, as well as the power of analysis or breaking down of substances. These changes are due to the formation in the tubular cell of an enzyme, which we call histozyme. The kidney is the end link in the vascular chain, and the daily performance of healthy kidneys is no doubt a combination of the mechanical and the vital processes.

The Secretion of the Urine.—In a perfectly normal being the problems of waste and repair are balanced to a nicety. As we know, the tissues of the body are bathed in lymph containing in solution the compounds that are necessary for their nourishment—proteids, carbohydrates, fats, salts, and gases. Waste follows in direct proportion to the activity of the tissues. The worn-out, effete material first finds its way into the lymph, and from it into the blood-stream, to be later eliminated from the economy, else deleterious results will follow their retention in the body. It is by the selective action of the cells of the various glands of the body that these useless substances are removed from the blood, and converted into such forms as can be readily excreted. In the main, the products to be removed are urea and the allied nitrogenous bodies—carbon dioxid, salts, and water. These organs are of vital importance, since nearly all of the waste-products containing nitrogen are eliminated in the urine.

The most easily understood function of the kidneys

is the excretion of the urinary water; this varies in amount with the rapidity of flow through the renal vessels and to some extent on the blood-pressure.

The separation of the solid substances of the urine form the next function of the kidneys, and these substances

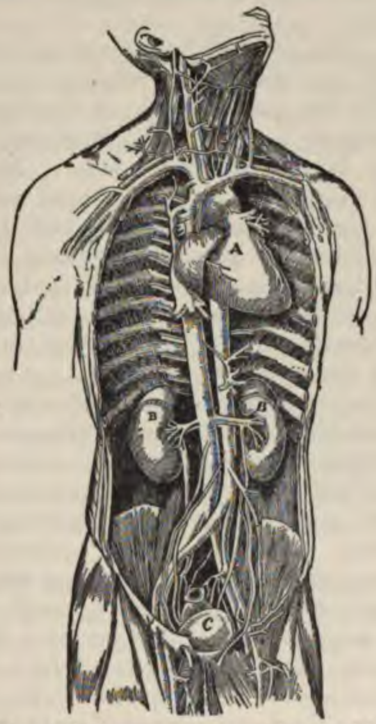


Fig. 11.—Relation of kidneys to heart and great blood-vessels: A, Heart; B, B, kidneys; C, bladder (after Quain).

fall into two groups—inherently useful materials, which are in excess or which have served their purpose, and substances which are inherently harmful. The latter class embrace many end-products of metabolism, which accustomed to consider as normal constituents of t

ic study of the urine is of great value to the
l surgeon, because of the knowledge which
rning the processes of metabolism occurring
dy. The nature and amounts of the various
of metabolism are carefully investigated as
the urine, whether they be normal or patho-

—The normal human urine recently passed is
, of a straw color, with an average specific
20, the specific gravity indicating the amount
tained in the urine. It is acid in reaction.
for twenty-four hours is 50 ounces, or
, depending on the amount of water ingested.
the amount secreted is less than at other
amount of urine is decreased after profuse
rhea, thirst, diminution in the blood-pressure,
ere hemorrhage. When the body temper-
iderably higher than normal, the amount of
diminished in quantity.
nearly one-half of the solids in normal urine

neys the animal dies of uremia; that is, there is an accumulation of urinary products in the blood. The removal of one kidney is not necessarily fatal, and women have so lived very comfortably for many years. A human being excretes enough poisonous material by the kidneys in two days to cause death.

The Urinary Excretory Apparatus.—After the urine has been secreted by the kidneys it must be carried away from the body, so that the economy may not suffer from the resorption of the contained toxic principles. The excretory apparatus comprises the ureters, the bladder, and the urethra.

The ureters are two cylindric tubes of the diameter of a goose-quill and about 15 inches long. They make their exit from the inner border of the kidney, and pass downward and inward toward the median line, to empty into the base of the bladder by a slit-like orifice.

The bladder is the reservoir for the urine. It is a musculomembranous sac, situated in the pelvis, and in the female it is in front of the uterus and above the vagina. It normally contains one pint. It should be emptied four times a day. If it is allowed to go longer than this, it becomes overdistended, and is apt to displace the uterus backward, and the bladder-walls themselves become weakened.

The Physiology of the Female Generative Organs.—The internal and essential organs of generation are the uterus, ovaries, and the Fallopian tubes. These organs have to do with the process of ovulation, menstruation, and reproduction.

The Ovaries.—These are two small bodies of an almond shape, and lie one on either side of the uterus. The bulk of the organ consists of connective tissue, in which lie embedded the Graafian follicles, or ovisacs, in which the ova are contained.

During the child-bearing period, or from about the age of fifteen to forty-five years, the development of the Graafian follicles and the discharge of the ova are con-

ng place. The liberation of the ova usually
t definite times, which, in general, coincide
nstrual epochs, one or more ova being set
period, but this is by no means invariable.
s.—The virgin uterus is a small, hollow,
an, somewhat pear shaped, whose cavity is
ches deep. The uterus is situated in the
pelvic cavity, between the bladder and the
It is held in position by broad elastic
go to different sides of the pelvis; it is also
orted by the structures below and above it;
y is the uterus held that it is easily pushed
r instance, by a full bladder or a packed
ersistently allowing the bladder to become
failure to have a daily evacuation of the
rolific sources of displacements of the womb.
Movements of the Uterus.—When no constric-
ed about the waist, the uterus moves freely
with every respiration. So distinctly, and
rularity, do these movements occur that an

uterus is to provide a favorable place for the reception of the product of conception, where it may be protected and nourished during the period of its development. The purpose of menstruation is to keep the uterus in suitable condition for the reception of this product of conception at any time. It is now known that the menstrual flow is not the whole of menstruation, and that the changes going on in the uterus are almost as continuous as the process of digestion.

Average Duration of the Menstrual Flow.—The average duration of the menstrual flow is five days, although the variations are considerable in healthy women. A flow lasting any place from two to six days is perfectly consistent with health, but a flow continuing less than two days or more than six days generally indicates a local or general disease.

Character of the Menstrual Flow.—For the first few hours, or perhaps for the first day, the flow is usually slight in quantity and light in color; on the second and third day the flow reaches its height, and is profuse and dark in color, but it should never be clotted; after this it generally ceases. The amount of the flow varies from 5 to 10 ounces. If less than 5 or 6, or more than 18 napkins, are pretty well saturated through, the amount may be considered abnormal.

Premonitory Symptoms of the Flow.—The premonitory symptoms of the monthly flow should not be so marked as to cause the individual any discomfort. The first indication of the return of the period should be the flow. There is generally a feeling of abdominal fulness, with some lassitude and sometimes slight headache. The temperature is lower and the pulse is slower than at other times. This lowered tone of the system is an additional reason for increased care against exposure in wet or cold weather.

Hygiene of Menstruation.—During the menstrual period all *cold* baths must be strictly prohibited, whether tub-baths or cold sponges. The reason for this is that the

f cold to the surface causes a driving in of m the exterior of the body to the internal at the time of the menstrual periods, there congested condition of the pelvic organs, be remembered that congestion is the first mmation.

rm sponge baths may be taken throughout nd the vulva should be bathed with warm a day throughout the entire period of the not only removes the clotted blood before s and becomes the source of irritation, but other irritating matters, and prevents the hat is caused by local irritation.

estion which is still *sub judice* is the necessity equency with which vaginal douches should physicians are agreed that a vaginal douche, ately after the menstrual period, is beneficial, all of the débris of the flow, which is some- itating.

A moderate amount of exercise should be

she should come into the house thoroughly chilled, the best thing to do is to take off her wet things as quickly as possible; be well rubbed down with hot rough towels; drink a cup of hot tea, and go to bed at once, with a hot-water bag placed over the abdomen or under the small of the back. She should remain in bed until the next morning, to the end that the circulation may regain its equilibrium as quickly as possible by the immediate relief of the pelvic congestion.

If this exposure should have caused the sudden cessation of the flow, a hot mustard foot-bath should be taken. One tablespoonful of ground mustard is used to the gallon of water, as hot as it can be borne; the pail should be made as nearly full as possible, without running over, and a blanket wrapped about the pail and woman, so as to cause a profuse perspiration; this should be kept up for ten minutes; as the water cools off, hot water may be added.

Profuse menstruation, painful menstruation, and scanty, very slight, or irregular flow are all abnormal conditions that are due to some abnormal or pathologic causes, and a good gynecologist should be at once consulted, so that not only suffering may be prevented, but that serious consequences to the general health may be averted.

CHAPTER V

VOUS SYSTEM AS THE BALANCE OF POWER IN THE BODY

he Master Organ of the Body; the Functions of the nd Automatism; the Physiology of the Brain and n; the Hygiene of Work; the Toxins of Fatigue; ns of Overwork; Nature's Restoratives; Avocation; c Necessity for Laughter; Vacations and Health; .

Eye-strain; Description of the Visual Apparatus; and Their Correction; the Mechanism of Eye-strain; ms of Eye-strain; Artificial Lighting; Hygienic Reading and Sewing; Injuries to the Eyes; Symptment of Conjunctivitis; Trachoma; Styes.

Nervous Disorders, Headache; Neurasthenia.

n the Master Organ of the Body.—The only the most important organ in the body,

[redacted]

needed to perform them. Mind and muscular movement have the closest possible connection with each other. The second function of the brain is that of feeling and sensation; the third is that of nutrition; through this its own nourishment and that of the rest of the body is regulated. While mind is the fourth and highest form of nerve force, it is not created in the brain, but is absolutely conditioned by that organ.

Different groups of brain-cells have different work assigned them; some have motion, some have sensation, some have nutrition, and some have mind. For example, special tracts of brain govern inhibition. While every group does its own work, it is related to and combined with others, influencing them, and being influenced by them.

Every kind of mental activity uses up the brain energy of the cells. To think clearly, plenty of healthy blood must be supplied to the cells. In order to make healthy blood, there must be an abundance of fresh air supplied to the lungs, and a vigorous heart to pump it up to the brain. It has been demonstrated that, during intellectual work or emotional feeling, there is an increased supply of blood to the brain, which may become more or less congested, and that there is an actual rise of temperature; whereas during periods of relaxation, rest, or fatigue, the brain is pale and anemic.

The brain-cells generally, but particularly those cells involved in mental activity, are of such a nature and constitution that they cannot rest absolutely during the waking hours. They may act slowly or with great rapidity; different brains have different capacities for energizing, both in regard to speed and force; and, further, the brain may be pushed to work greatly in excess of its normal activity, just as an engine may be allowed to go at the rate of 50 or 60 miles an hour, or
pushed to go at the rate of 100 miles an
cases the danger resulting from s
excess of going at the normal rate

se, the continuous brain action implies the r continuous repair. The only complete rest which the brain enjoys is during sleep, ocess of repair goes on most rapidly; during he brain-cells absorb their nourishment from excess of their needs, and so lay up a store of e waking hours.

d Automatism.—It is one of the innate very tissue and of every organ in the body, y vital action is performed, any vital proc- ugh with, it is easier to do it the second time, tinuous exercise of the action makes the per- ore and more easy, until they become auto-

logic basis of habits consists of the plasticity substance, and in the capacity of nerve sub- ceive and retain impressions. There results y that the nervous system will act again in those ways in which it has already acted. e hand, the automatic performance of work

time limit in habits is one of the strong evidences of the close connection of body and mind. It is a startling fact to face, that a woman's habits are largely fixed before she is twenty; that the chief lines of her future growth and acquaintance before she is twenty-five; and her professional habits before she is thirty; yet to something like this James believes that physiologic psychology points. The woman becomes a bundle of habits, and her habits settle about her like a plaster cast.

The Physiology of the Brain and Nervous System.—The brain, spinal cord, and spinal nerves constitute the so-called cerebrospinal nervous system. The brain is that portion of the nervous system which is contained within the cranial cavity and which it completely fills. The spinal cord is the continuation downward, from the brain through the spinal canal, of nerve substances, and from which the spinal nerves are given off. The nerves may be described as cords and threads of varying degrees of fineness, distributed to every tissue and organ in the body.

The nervous system has been likened to the electric telegraph, the brain being the central station, while, in addition to the special senses, the body is provided with numerous terminal substations in the skin and internal organs of the body, which keep the brain informed of what is going on in the world around it, as well as in the various parts of the body. The nerves simply act as conductors to transmit the messages. The body is supplied with two distinct sets of nerves or wires, one of which carries messages from the outside world and various organs to the brain, while the other set transmits orders from the brain.

The spinal cord is the center of reflex acts; that is, if the leg of a brainless frog is touched with acid, he will take the other leg to wipe it off with. There are, as we have seen, substations in the skin, hence the acid causes the sensation of a foreign body, word is telegraphed the spinal cord, where there is a large central

ord is sent out by another set of nerves, to
away from the acid, but this being insufficient,
graphed to the other leg to wipe off the offend-
ce. Did the same thing happen in the body,
time that the cord telegraphed word to the
mber to withdraw it, it would telegraph the
he sensation of pain would be felt.
e travels along a nerve at the rate of about
ards a second, or a mile a minute. This is
ime made by a lightning express train. The
the body being so short, the time taken is
le, and we say that movement is instantaneous.
s traveled by nerve impulses are made passa-
; the oftener an impulse traverses a given
ore adapted such a route becomes for future

f this has to do with the nerves which are
ontrol of the will. There is another set of
ires in the body, called the sympathetic or

of mind from the mind cell and of motor stimulus from the motor cell. The proper selection of work for that particular brain to do, and the physiologic regulations of the work done, is the basis of the hygiene of work. For health, for happiness, and for efficiency, right work rightly done is the most important matter in any man's or any woman's life.

The physiologic, as well as the moral necessity, has always been conceded for every man to have a life-work—a vocation; a work for which he should be fitted, and for which he was capable, sufficiently congenial not to sink into mere drudgery, and which would, at the same time, afford ample financial compensation to be remunerative and a stimulus to his power of endurance.

Important, from a physiologic point of view, as a vocation is for men, it is equally or even more important for women. It is highly probable that the unstable nervous system of women and their emotional extravagance and dissipations, whether of frivolity, wickedness, or grief, is largely due to lack of mental discipline and muscular development. It is a psychologic proposition that any woman who has a toothache suffers less if she keeps busy, and any one will testify that she suffers much less from the intense heat of summer if she is busily employed.

One of the great objects of a definite and fixed occupation is to turn the thoughts out from the ego. Work of some kind is indispensable to the health and happiness of every one, since it necessitates an objective instead of a subjective attitude of mind.

Experience teaches that the brain, like the muscles, is subject to training; occasional excessive efforts, with long intervals of repose, are rather injurious, while a many-sided activity, constantly repeated, interrupted by sufficient shorter rests and supported by sufficient nutrition, is strengthening. A healthy training of the brain should be as many sided as possible.

Symmetric development and training of every func-

e brain is as essential for mental efficiency and the development of all the muscles of the body ly vigor, and a one-sided training of the mental as certain to produce eccentricities of habits of nd actions as those occupations which call only the action of certain groups of muscles is odily deformities. Anything which will prove o the delicate nerve substance must be avoided, , idleness, and, worst of all, any form of nar-

ded life work, consistently carried through, not gthens the brain, but also its continued power ion, and one's whole life is a continuous struggle ation. The more the brain works, the more is of receiving new impressions and elaborating nd it retains its elasticity longer.

enerally implies lack of system in carrying out e of work, or the undertaking of more work individual can accomplish without injury to Few things can more certainly muddle the brain

By undue pressure, at any period of life, it is possible to use up energy that ought to have been spread out over long periods; and this is emphatically the case during adolescence; too heavy a drain is made on futurity, which means a serious breakdown, or, at least, premature old age.

It has long been assumed that during the activity of muscles substances were produced which exerted a poisonous influence upon the muscle tissues. Exactly what these substances were was not known, but it was supposed that they were definite products of metabolism or tissue waste. It is a well-known phenomenon, observed during the training of athletes and soldiers, that prolonged and disciplined exercise makes it possible for individuals to support easily an amount of work which would prove exhausting or even fatal to the untrained. Increased work, under any circumstances, means increased metabolism, and consequently a more rapid accumulation of its products.

A German investigator, Dr. Weichardt, has shown that if guinea-pigs were put upon a miniature treadmill and forced to run it until they dropped dead from exhaustion, a highly poisonous liquid could be pressed from their muscles, and that the injection of this liquid or extract into the veins of healthy guinea-pigs produced, when administered in small doses, rapid fatigue; whereas, larger doses caused death, accompanied by all the symptoms observed in the original animal during the process of mechanical tiring.

On the other hand, liquid taken from unworked guinea-pigs had no such effect. Further, that if these little animals were put upon a treadmill and worked to just short of exhaustion, and then were given time to recuperate, as we say, the liquid or extract from their muscles had no such effect: it was quite harmless.

From the results of these carefully carried out scientific investigations, Weichardt has come to the conclusion that fatigue is due to a definite toxin, analogous to that

ia and tetanus, and he believes that the ex-
f the phenomena of training lies in the fact
body of the athlete there must be a specific
" which neutralizes the "fatigue toxin" as
s formed.

imals undergoing these experiments of extreme
re was a fall of temperature. A practical use
could be made for the individual, by noting
hat a subnormal temperature was a grave
al.

servers concede that fatigue is due to chemical
produced in the body as the result of brain
activity, and find that these toxins produce
g effect, especially on the muscular system,
he sensation of fatigue is in large part the
on of this depression. The action of toxins
ned to the tissues in which they arise; exces-
y of one tissue can cause fatigue of others.
f acid intoxication are noticed as analogous
phenomena, so far as the latter are due to

Fatigue is not, therefore, merely physically uncomfortable; it is intellectually, physically, and morally dangerous.

Overwork.—A surplus nervous energy must be persistently aimed at—what Emerson calls "plus health." It must be indelibly impressed on the intelligence of every one that no fatigued individual can be at her best; she is doomed to do inferior work, to be mentally depressed, and to be morally weakened. Hope and courage ooze away, and all sense of proportions and perspective are lost.

The amount of work that can be performed without fatigue is a matter of individuality, and the only safe gauge of overwork are the danger-signals sent out by nature—loss of appetite, insomnia, increasing exhaustion from day to day without increase in the amount of work done, mental depression, lack of interest and initiative. No one can afford to disregard these danger-signals.

Habitual overwork produces fag and a desire for stimulants to act as a spur to the overworked muscles during the day, and recourse to increased stimulants or sedatives to act as hypnotics at night. The inert nerve-centers have no reserve energy to give out, so it is worse than useless to stimulate them. On the other hand, the nerve-centers are at too low an ebb to react from the depressing effects of sedatives, which, to the individual, must be positively injurious. The aim must be to promote nutrition, and to give complete rest to the exhausted nerve-centers.

Brain work, to be beneficial, must be regulated with the greatest care. During the exercise of the brain there is always an increased blood-supply to it. If the exercise is continued too long, there is a tendency for the blood to remain in too great quantity, due to the exhaustion of the nerve-cells, which are no longer able to contro[illegible] vessels.

During sleep the blood-supply to the brain is di[illegible] and the cells recover themselves, but if this h[illegible]

ntly kept up, sleep soon becomes impossible, ells have no opportunity to become repaired, ctivity is diminished.

on says: "Making all allowances for differences, e prime of their mental and physical vigor, luals can exceed six, and for most persons ould direct not more than four or five hours ntal application, without seriously endangeralth."

dvantage is gained by eight or ten hours of , since the memory and reasoning powers exhausted that the assimilation of ideas wer and more difficult. When in his prime, tt declared that six hours a day was all that ofitably spend upon his literary compositions. ars, because of his pecuniary embarrassment, beyond this limit, and, as the result of excesis last years were spent in hopeless imbecility.

f **Overwork.**—These show themselves in with a sense of exhaustion, the irritability

as the skin after a blister, and the calm, vigorous mental labor is superseded by feverish anxiety, wearing responsibility, and vexing chagrin.

When the brain is well supplied with a powerful circulation, and a rich blood-supply from a good digestion furnishes it with an abundance of pabulum, the cares of life are borne with equanimity and cheerfulness. One of the most unerring signs of failing health is the inability to withstand the pressure of these same daily cares. When the cares that formerly sat lightly on the shoulders become well-nigh an insupportable burden, a state has been reached where the mind reacts on the body.

Worry.—It is readily evident that worry is bred of exhaustion, and is one of the signs of overwork; but, if too often indulged in, it becomes a fixed habit, and the mind rapidly becomes settled in a state of gloom.

It is most important for overwrought business and professional women, but most especially for those women whose vocations in life combine three distinct occupations or callings—namely, wives who act in the capacity of housekeepers, ministers of finance to the household, and the bringing up of children—to realize the importance of not undertaking more than they can accomplish without fret and worry. The overconscientious woman may object that it is selfish to consider her own comfort when she has work to do for others, but to expend too freely of the nervous energy, even in a good cause, is like giving so much of our substance to charity that we ourselves are in turn obliged to lean on others for support. In properly conserving our own energies, we may ultimately be lightening the burden of others. There is a proper balance between the duty one owes to one's self and to others.

Once bred, worry is an endless chain. Tell such a woman not to worry, and she worries for fear she may worry. She is afraid that she has decided wrongly, and regards decisions in regard to the most trivial affairs of life as though they were matters of vital importance.

ion "to arrive" is a fertile source of fret and
habit of mind leads to frantic and incessant
cks all pleasure at every point. The person
game only to see who wins, loses half of the
recreation.

of the stork are long, the legs of the duck
ou cannot make the legs of the stork short,
you make the legs of the duck long. Why
hinese proverb.)

—This is another symptom of overwork.
orried and harassed all day, retires at night
n the darkness and solitude with worries,
doubts, and regrets, which now assume
fantastic shapes. In this case the insomnia
lty habits of mind.

orm of insomnia is caused by intellectual
carried on at night until time for retiring;
then so fully saturated with the subject
ble to throw it off on going to bed.

be the cause of the insomnia, it soon becomes

among the various methods of refreshing body and mind —the toilet, eating, rest, and recreations.

Not only are rest, recreation, and sleep in proper proportions essential to the health of the body, but they are equally essential to the quantity and the quality of the output of work. From them result a feeling of physical well-being, an exuberance of animal spirits which go into the work. The perspective is more accurate, the judgment is clearer, and the creative power is greater. Work goes of itself with a swing. Happiness is an expansive quality, that makes itself felt throughout the entire body, but its effects are most manifest in the mental power.

The mother who so honestly works and plans for the good of her family as to give herself no time to rest after her physical efforts is in such an exhausted condition as only to be able to give them the tired and critical side of herself for daily association. There are few human achievements much finer than to make human beings happy, and this power woman is endowed with to a very large extent.

Rest, to be of value, must be systematically taken. Bearing in mind the shrinking in size of the nerve-cells after stimulation caused by work, and that they recovered their normal size in relatively less time if the shrinkage were less, it becomes obvious that, in order to accomplish the best work, whether purely mental, or of the more complex mental and physical work demanded of the mother who is at the same time the housewife, that a break in the day's work will aid in securing the best results.

The exact time of the daily *siesta* must be adapted to the family régime, but a fixed hour should be set aside for this purpose, and this should be known as the mother's hour, and nothing short of a catastrophe should be allowed to infringe on it.

The woman should retire to her bed-room, undress, and go to bed. The room should be darkened, and at

ne there must be an abundant supply of fresh
oon forms the habit of taking a short nap, of
f an hour; one hour should be spent in bed.
she gets up, takes a shower or other bath,
l is then ready to enjoy life and be a comfort
y. In this way alone can absolute relaxation,
l, and body be secured.

n.—Second only to the physiologic necessity
ion in life, is the necessity for an avocation,
ist be in the nature of a recreation.

ell-known fact in farming that any one kind
l exhaust the very best soil, but few people
ne necessity for a change of occupation and
in order to produce the best mental and
ults.

rudgery drains the springs of health. There is
arvation, due to the lack of recreation, as well
cal, due to the lack of bread. The French aris-
ed for the gaiety of their pastimes, in spite
tetic and other sins, furnish a remarkable list

to exercise are no safe guide as to their ability to take exercise.

The first cause of the feeling of fatigue is due to the lack of oxygen in the lungs and the impure air of the room. On going out-of-doors, the woman will be surprised at how much stronger and better she feels after an hour's brisk walk than she did on starting out.

"Fancy work" and lace-making, instead of being classed with recreations, must be classed with fine hand-sewing of the most taxing kind. It calls the same groups of muscles into play, and is productive of the same evils, with a greater tendency to produce eye-strain and a paralysis similar to writer's cramp.

The proper avocation of the tired housewife, who has been on her feet all the time and whose vocation is manual labor, will be the diversion of the mind by reading a good book, while comfortably pillowed on a veranda chair, a drive, a visit to some congenial friend, a game of cards, or music.

Literary clubs for women should be more largely organized through the country and in country towns. In the cities women have found these clubs a great boon, not only to the health and happiness, but they are in the highest degree educational.

Further, women have found that these literary clubs were profitable, as a means of bringing their minds in contact with other educated minds, and thus they had not only the additional stimulus to study, but a broadening of their horizon, which the woman's heretofore shut-in household life had precluded. Courses in domestic science would be a boon to the home.

The greater the number of interests which education and culture have created, the greater will be the diversity of the recreations open for the woman's enjoyment.

Care must be taken that the avocation, which is at first an enjoyment and relaxation, is not turned into hard labor. The moment that any one strains every nerve,

cel in a game, that moment it ceases to be a

shows that the laws of all nations have always certain number of days of rest, or at least a occupation, and that these days were fixed at ss regular intervals. This was partly from a nd partly from a hygienic standpoint. The r the interruption of the regular routine work been recognized, and one day out of every been set aside for this purpose.

om that is so frequently adopted by city folk ut of town over Sunday might very well be country folk by going into the town or city y. For not only is the too continuous applica-e's employment fraught with danger, but it onclusively shown that a monotonous routine on, such as lived by the average farmer's wife, ax on the sanity of the mind. Statistics show aviest percentage of insanity falls on farmer's the supposed cause of this is the monotony of

ity, and that seriousness is a tiresome necessity, which must be tolerated from time to time. But very few people have any idea that there exists a well-defined physiologic necessity for laughter, and the greater the intellectual labor and the mental strain, the greater is this necessity.

The deep forcible chest movements increase the rapidity of the circulation, the force of the heart's beat, and secures a more complete oxygenation of the blood.

It is not improbable that this accelerated circulation produces remote effects on the organism. One of the immediate effects of a good laugh is that it relieves the brain by the rapidity of the movements of the blood through the capillary circulation.

In addition to the immediate physiologic effects which result from laughter it is highly beneficial, by relieving the brain and nervous system from the intense strain and tension of the daily affairs and occupations of life, and gives relief to the severely congested capillaries, which otherwise involve considerable risk to the individual.

Physiologists hold that pleasurable feelings tend to further the whole group of organic functions, and that laughter produces a considerable increase of vital activity by the heightened nervous stimulation. There is a sense of increased energy, of a high tide of the fulness of the life current.

Vacations and Health.—The secret of success of the old Romans in conquering the world lay as much in their ability to maintain the health of their troops in their various campaigns as by the courage and organization of those troops; or, rather it may be said that courage is but the coefficient of a good physique and a general mental vigor.

A rest one day out of seven, with an occasional outing for the week-end, is good but not sufficient. If one would keep up to her highest standard of physical and mental efficiency, she must have at least one month of absolute change of environment and outdoor life in the year.

The kind of place one choses for her vacation will

where her home is. To dwellers in cities, the and seaside resorts are the most beneficial. ur most trying month, and every one who can well to take her vacation at that time, always ome resort north of her own home, so that she the additional advantage of a more bracing

urnishes many of the most beneficial of our rts, combining as it does so many attractions— atmosphere of pine forests, its beautiful th vast expanses of water, and the great variety ns which it affords.

ys wise to send an advance scout to investigate n which you contemplate spending your vaca- id low and swampy land; investigate the of the water-supply and the nature of the together with the sewerage system, for it is quent that an attack of typhoid fever follows in the country. Every good summer resort nish facilities for a variety of outdoor sports—

inspired air is only one-seventh of that during the waking hours; the temperature of the body falls; less blood circulates through the brain; and the sensibility of the nerves to external stimuli is diminished. Sleep is not only *par excellence* the time of repose and recuperation of the brain and nerve substance, but it is the only time when, by the diminution of waste caused by the incessant activity of the brain, that the organ can be properly nourished, the deficit in nerve force canceled, and the surplus of energy stored up.

Without this absolute remission of brain activity every twenty-four hours an actual destruction of substance would occur, which, if persisted in, would be so depressing to the nervous functions as to be inconsistent with life, and this is the case in the concluding stages of fatal diseases.

The sleepy feeling caused by fatigue is due to the circulation in the blood of toxins resulting from tissue waste, which benumb the brain-cells; while the feeling of freshness and *bien-être* with which one awakens in the morning is due to the elimination of the fatigue products from the blood during sleep. If the blood of a tired dog be transfused into the veins of a perfectly fresh animal, the latter will immediately show symptoms of somnolence and seek a dark corner for sleep.

The medical authorities of to-day are pretty well agreed that eight hours of sleep is the minimum required for the maintenance of health, and all concede that the brain-worker requires more sleep than the manual laborer. Every moment after the feeling of languor presents itself is a strain upon the nerves and muscles which will sooner or later invalidate for life, and finally bring the victim to a premature grave. Habitual deficiency of sleep will undermine the strongest constitution.

It is a matter of great importance to train one's self in the habits of sleep, regularity in the hour of retiring, abstinence from active brain work for the hour immediately preceding going to bed, since, if active brain work is con-

til one goes to her room for the night, the chances he brain will continue its activities after getting and sleep may be banished from the pillow l hours.

ninutes spent in breathing exercises, the vigorous flesh brush or hair glove, a hot plunge or foot-no mean hypnotics.

d sleep is dreamless. Dreams require a certain re of nerve force and mental energy, so that sleep is the most restful. Disagreeable dreams nt-mares" are generally associated with indiges-biliousness, which also occasion a general rest- All this can be overcome by taking some med-the liver. Two grains of calomel taken just iring often works like a charm. The dose must peated under a month. In case of tendency to no coffee should be taken after breakfast.

ent of Insomnia.—The mechanical measures lief of insomnia have for their purpose the with-f the blood from the brain to the surface of the

does not take into consideration that in all near work, as in reading, writing, sewing, etc., the eye is actively engaged as well as the hands and brain, and that the eye only is at rest when looking into space or when closed.

Description of the Visual Apparatus.—The eyeball is contained and protected in a bony cavity, formed by the bones of the face and skull, and is supported by a cushion of fat and other tissues. It is held in place by its membranes and muscles, by which it is also moved. It is further protected by the eyelids, the eyebrows, and the eyelashes. The eyebrows protect the eyes from dust and perspiration and shade the eyes.

The eyelids are lined by a very delicate mucous membrane, called the conjunctiva. They are maintained in close apposition to the eyeball by atmospheric pressure. The tears are secreted by the lacrimal gland, which is at the upper and outer angle of the orbit. The lubrication by the tears and the mucus secreted by the conjunctiva cause them to move smoothly and without friction. An important function of the lids is to distribute the tears over the front of the eyeball, and by incessant winking to free the front of the eye from dust and to keep it moist.

The conjunctiva is continuous with the mucous membrane of the nose and mouth. Hence, in inflammation of the nasal mucous membrane, as in an ordinary cold in the head or influenza, the conjunctiva is liable to become very much congested or inflamed.

The *eyeball* is spherical in form, having the segment of a smaller and much more prominent sphere ingrafted on its anterior part. The segment of the larger sphere, which forms about five-sixths of the globe, is opaque, and forms the sclerotic coat, the so-called "white" of the eye. The smaller sphere, which forms the remaining sixth, is transparent, and is formed by the cornea.

The *iris* is a circular contracting membrane, suspended from the edges of the cornea, in front of the eye like a curtain. The iris gives color to the eye, and when we

eye is blue or brown, we mean that is the color
The iris is freely movable, and, according as
it dilates or contracts, there is an alteration
of the central aperture, called the pupil.
function of the iris is to regulate the quantity
itted to the interior of the eye. In a very strong
pil quickly contracts, shutting out the exces-
while in a subdued light the pupil dilates, thus
re light to enter. When looking at a distance
king languidly into space, the pupil dilates.
ation of the Image.—The eye is a camera, con-
series of lenses and media arranged in a dark
e iris serving as a curtain. The object of the
s to form on the retina a distinct image of
jects.
hanism of Accommodation.—In the passive
f the eye, when it is adjusted for far objects,
r surface of the lens is somewhat flattened.
tion for near objects consists in a contraction
lar ciliary muscle and an increase in the con-

common refractive defects of the eye. In this condition, because of the greater length of the eyeball or increased refractive changes of the media, rays of light from a distance are focused in front of the retina, producing an indistinct image.

The near-point is brought much nearer—from 2 to 2½ inches—and the far limit is at a very short distance.

In reading, the myope is obliged to hold her book very close to the eyes in order to see. In doing so, she strains her muscles of convergence, producing ocular congestion and compression of the eyeball.

The predisposing causes of myopia are heredity; it is said that half of myopics are descended from near-sighted parents; uncorrected astigmatism, and the effort to read very fine print or figures, entails severe strain on the eyes, which may result in myopia.

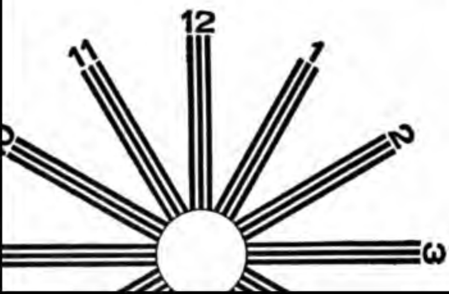
Myopia is corrected by a concave lens, which diverges the rays of light, prolonging the focal distance, so that the rays of light are focused exactly on the retina.

Not only are myopic eyes not injured by wearing suitable glasses, but, on the contrary, are often preserved from injurious pressure on the globe, due to the indulgence of the habit to nearly close the lids in order to see better, as is commonly done when glasses are not worn.

Hyperopia or Far-sightedness.—In this condition the eyeball is too short, and the rays of light from a distance are focused behind the retina. Instead of being distinct, the image is blurred. Hyperopia is corrected by a convex lens, which converges the rays of light, bringing them sooner to a focus. In the hyperopic eye the near-point of accommodation is at some distance, and a far limit of accommodation practically does not exist.

Presbyopia.—This is a loss of the power of accommodation, by which reading, writing, sewing, and other near work is accomplished. This power of accommodation is greatest in early life, and gradually diminishes until about the age of forty years, when reading at the ordinary distance becomes uncomfortable. At about

years of age the power of accommodation
y lost.
rson over forty-five years, with normal or far-
, should wear glasses to perform near work.
sm.—Astigmatism does not depend on the
e eyeball, but on the curvature of the cornea,
n that of the lens. Uncorrected astigmatism
the expenditure of more muscular effort in
t to see distinctly than is necessary when



furnishes a test for astigmatism, since to the normal eye the lines appear of equal distinctness and clearness. Astigmatism is a very common ocular defect.

The Mechanism of Eye-strain.—Comparatively few eyes are perfect. Far-sighted or astigmatic eyes can secure perfect vision by means of accommodation. By constant strain on the ciliary muscle, the crystalline lens is so increased in curvature as to exactly counterbalance the optical defect of the eyes.

Healthy eyes should do their work without the consciousness of the owner, and this is a safe test as to the kind and amount of work demanded of them.

Perfect rest for the eyes is impossible in the waking state—distant vision represents rest for the eyes and near vision exertion.

Near work is the chief cause of near-sightedness. Distant vision should alternate with near work, and in near work the object should not be brought nearer to the eyes than 12 inches.

The Local Symptoms of Eye-strain.—There may be a sense of fatigue in the eyes after reading for a short time, and this may be followed by a constant sense of discomfort in the eyes, which is increased on using them, and which may be accompanied by severe pain in the back of the head. There is a sensitiveness to light, and inflammation of the eyelids and conjunctiva. There may be twitching of the eyelids, and in extreme cases difficulty in keeping the eyes open on account of drowsiness. The eyes may smart, itch, or burn, and continually "water."

As the trouble becomes more pronounced, reading for a short time may be followed by a blurring of the type, and finally the lines may run together. There is a constant sense of the eyes feeling for the lines, and, perhaps one of the first things to call attention to the condition of the eyes may be the losing of the lines in reading.

The general or reflex symptom of eye-strain is headache, which frequently takes the form of migraine. This

on reading, sewing, riding in the cars, etc. ne is usually over the region of the temples e the eyes, but it may be on the top of the he base of the skull.

o fundamentally related to all the brain func- ye-strain, or anything which interferes with t, may cause the most varied disturbances nctions.

ention of Eye-strain.—Persons whose work much ocular labor should vary their duties als of rest. In continued reading or sewing desist at short intervals and fix the gaze on some ct, and to frequently close the lids.

k, very fine needle work, working on black ing very fine print, or print on an inferior aper, or attempting to read in a dim light, are tax on the eyes, and should be avoided, certain to cause them permanent injury.

vision is so common in school-children, it is esent without being suspected, and so much

Protection of the Eyes from the Glare of the Sun.—In very hot weather the eyes should always be so protected that the rays of the sun do not shine directly into them. This protection may be afforded by the brim of the hat or by a parasol. At the sea-shore, or on an ocean voyage, where the glare of the sun is constant and particularly trying, the eyes should be protected by wearing slightly tinted smoked glasses.

Artificial Lighting.—The main sources of artificial lighting are kerosene, gas, and electricity. The principal questions of importance are the quantity and quality of the light, its steadiness, the vitiation of the atmosphere by the products of combustion, and the expense; also the proper arrangement of the light.

Kerosene is the most extensively used means for artificial lighting. The principal objections are—the heat, the trouble of filling and keeping the lamps in order, and the danger of explosion and fire if upset; the odor and the great vitiation of the atmosphere.

The modern lamp gives a brilliant light, and if properly shaded by a slightly bluish chimney, so as to absorb the excess of yellow rays, it is very satisfactory.

Illuminating gas, as furnished in cities, has a great excess of yellow rays, which are very injurious to the eyes, and the vitiation of the atmosphere is very considerable. Gas-light is modified by the Argand and Bunsen burners. Of these, the Bunsen burner, a patented composition burner, heated to incandescence, is the best. It gives a white light, resembling daylight, and, under proper adjustment, a far greater volume than any other burner. It is not so hot, does not consume as much gas, and so there is less vitiation of the atmosphere. It is intensely brilliant, and must be shaded by ground glass or a proper shade.

Electricity gives the very best light, with a minimum amount of heat and vitiation of the atmosphere. For individual use 16-candle power is sufficient.

The lamp-shade should be opaque, of a dark-green color, and lined with a white, reflecting surface. Transparent

s, especially when patterned, are always bad,
heir color; because of the different degree of
thrown upon the work, the light is irritating

Precautions in Reading and Sewing.—
d be free access of open daylight. Near the
bviously the best place for working, and the
be so selected that the window is to the left of
This prevents the work from being shaded
l, and protects the eyes from being fatigued
falling directly into them.
will have too much light into which the sun
tly. Even if the worker's face is not turned
ard the sun, yet the light reflected from the
er work will be so intense as to be dazzling.
and most pleasant light to work by is the
ht from the northern sky. An excess of
e easily regulated by a shade.
–Very fine type should always be avoided,
unnecessary strain on the eyes, as are also

and is particularly bad when convalescing from an illness or when very tired.

Reading in carriages or cars is injurious to all eyes, but especially so to myopic eyes; because of the constant jolting, the distance between the type and the eyes is continually changing, necessitating the frequent and abrupt adjustments of accommodation; besides, the illumination is apt to be very poor. Reading in a dim light or the twilight is also very bad for the eyes.

Sewing and embroidery require the most trying ocular labor and the best conditions for illumination. Working on black goods by artificial light should be absolutely forbidden.

Injuries to the Eyes.—The most common injuries to the eyes are the entrance of small particles of dust, cinders, steel filings, etc., into the conjunctival sac, or into the substance of the cornea. Frequently, with the aid of a little winking, the tears wash away these foreign substances, but if the susbtance lodges in the lining membrane of the upper or lower lid, or is imbedded in the cornea, it may be necessary to resort to other means in order to remove them.

The lining membrane of the lower lid is brought into view by simple tension of the lower lid downward by one finger. If the offending particle is not seen, the upper lid should be everted. This may be easily effected by the fingers alone. The patient is told to look down, the edge of the upper lid and the lashes are seized by the thumb and forefinger of the right hand, and the lid is drawn at first forward and then downward away from the eye, then upward over the point of the thumb or forefinger of the left hand, which is held stationary on the lid and acts as a fulcrum. The foreign body should be removed with the handkerchief, but, if it is imbedded, it may be necessary for a competent physician to remove it.

The habit of opening the eyes when dipping the face into a basin of water, or when diving, produc
and inflammation of the conjuncti

ms and Treatment of Conjunctivitis.—The be blood-shot and the lining membranes of the sely red. There is a sense of irritation about nd an intolerance of light, with a constant sense fort. The sensation produced is that of having e eyes. The eyes are heavy, and tire after using a short time.

st treatment for acute conjunctivitis, which is aused by the penetration of dust or other foreign o the conjunctival sac, is the application of r. A folded handkerchief is wrung out of ice- l laid on the closed lids. It must be changed minutes, so that it shall not become warm; s are necessary. When the acute symptoms n to abate, the patient will no longer find these ns grateful, and they must be discontinued.

onic conjunctivitis hot applications are the best. , one teaspoonful of fine table salt may be dis- a pint of hot water, or two teaspoonfuls of boric be used instead; the last named is a mild anti-

now, is another name for granular conjunctivitis or granular lids. The affection is very contagious. It comes on slowly, and is frequently accompanied by redness and an appreciable degree of secretion in the early stages. Presence of secretion or of interference of the vision should always attract attention.

Strict precautions must be taken that the patient's handkerchief, towel, and wash-basin are not used by other members of the family. Further, the other members of the family should bathe their eyes several times a day with a solution of boric acid.

Styes.—Styes are a very painful species of small boils that generally form on the edges of the eyelids. They are apt to appear in succession. Certain persons are liable to them if the system is run down from general causes. Like boils in other parts of the body, they give evidence of impaired nutrition.

Hot fomentations of boric acid solution will sometimes abort them if used early. If pus has formed, the stye must be opened by an incision parallel to the edge of the lid. This should not be attempted by any one except a physician.

Color-blindness.—As a rule, about 4 per cent. of males and about one-half of 1 per cent. of females are color-blind. The part of the color sense that is most often deficient is that for green and red.

Cataract.—This is a disease in which the crystalline lens or its capsule, or both, lose their transparency and become opaque. Eventually total blindness is the result. Senile cataracts appear after the forty-eighth year. The only remedy for the disease is the surgeon's knife.

Functional Nervous Disorders.—Evidences of sound health are: first, individual adaptability or capacity of the individual to easily adapt herself to extremely opposite conditions of existence; second, endurance, or the capacity to do a considerable amount of mental work for a short time without suffering fatigue, or to be able to quickly recover from the fatigue; third, to be able to

emotions; fourth, to be able to resist morbific that is, the capacity on the part of sound xcretion to quickly eliminate all poisons from

s of debility are just the reverse: first, de- esity, or leanness; second, personal inadapta- is, when physical or mental discomfort is such slight provocations as change of food, climate; third, lack of endurance, so that a s required to repair the fatigue incident to ion; fourth, lack of control of the emotions; oclivity to morbific influences, so that the succumbs to every contagion or miasm that ters.

ess is a disease of civilization, coupled with nd indoor life. The more complex the environ- ich the individual finds herself, and to which djust herself, the greater the demands made on s system.

eme dryness of our climate, together with the

disordered, as in gout, rheumatism, kidney diseases, diabetes, and the infectious fevers and malaria.

Among the more common reflex causes are eye-strain, especially errors of refraction; disorders of digestion, particularly constipation; and pelvic disorders, as in inflammation of the pelvic viscera.

Functional diseases of the nervous system causing headache are overwork, neurasthenia, hysteria, epilepsy, and neuritis.

Among the most common of the organic diseases is arteriosclerosis; other diseases are meningitis and brain tumors.

Symptoms.—The pain is often dull in character and rendered worse by stooping; the location of the pain depends on the cause of the headache. The most common variety is over the forehead or eyes. In eye-strain the pain may either be in the front or back of the head. In indigestion, the pain is most frequently over the eyes, but it may also be on the top of the head. In anemia the pain may be either frontal or diffuse. In pelvic disorders the pain is generally at the base of the brain, though it is sometimes in the top of the head.

Neuralgic headaches are generally characterized by sharp paroxysmal attacks, located in the temporal regions, and associated with pain in other parts of the body. It is perhaps most frequently caused by anemia.

In hysteria the headaches are characterized by a circumscribed pain—it has been likened to the driving of a nail into the head.

In migraine the pain is paroxysmal and intensely severe; it is frequently caused by some poison in the blood, as in autointoxication, due to failure of proper regulation of the bowels, also by pelvic disorders.

Treatment.—The treatment is constitutional, and is based on the removal of the cause. First, there should be a regulation of the diet, a free evacuation of the bowels, and their proper regulation. In every case of headache there should be an examination of the urine. Often there

ngestion of the kidneys where it is least sus-
f the headache is persistently made worse by
sewing, the patient should be referred to a
oculist. An inquiry should always be made
ndition of the menstrual function, backache,
rhea. Any marked disorders here will neces-
necologic examination.
mmediate relief of migraine, the patient should
to bed and drink a glass of hot water; some-
p of hot tea gives great relief. No food should
or from six to twelve hours, according to the
the case. The room must be kept dark and
he head high.
of prepared mustard leaf, 5 inches wide by 8
, should be cut, and a piece of cheese-cloth, 6
thick, should be folded the same size. The
n is then wrung out of hot water, and the
af is quickly dipped into the same. The cheese-
ced on the back of the neck, between it and
rd leaf. The clothes should be kept dry by

patient shall not be disturbed through the night, and it is not so apt to cause nausea as when taken through the day.

Neurasthenia or Nervous Prostration.—This disease first saw light in the United States, and was christened by Beard as an American disease that was absent from no household in which the inhabitants used their brains. It is certainly much more prevalent in this than in any other country. Americans scarcely treat their bodies with more consideration than their automobiles; they put on high pressure and speed them to the utmost. Add to the high pressure under which we live that other fact of heredity, that many persons are born with unstable nerve-cells, and may be nervously bankrupt, and it is not difficult to understand that 50 per cent. of Americans are suffering in some degree from lowered nerve tone.

Causes of Neurasthenia.—All classes of men and women who use their brains severely, and who have seasons of excessive anxiety and responsibility, are subject to neurasthenia. We have seen that fatigue was caused by the accumulations of toxins in the body, due to muscular activity, but these toxins may also be caused by intellectual overwork or anxiety over domestic or business affairs.

Other causes are the intemperate amount of intellectual work which is forced on the brain, and the excessive indulgence of the emotions and the passions. Combined with the strenuousness of life is the large element of uncertainty, the intense anxiety, and the restless energy which is the price of success. Added to these may be lack of suitable and sufficient recreation and short hours of restless sleep; the restrictions of a narrow lot, loneliness, and isolation, the frequent repetitions of uninteresting tasks, added to the burdens of maternity, domestic cares, and worries.

In cities the ear-strain caused by the incessant noises of the street, the amount of work done by insufficient and improper lighting, the unsanitary mode of life, the

r diet, the monotonous and infertile work, the ness and discontent bred of a life of idleness, or n to society and gambling, whether bridge whist the senseless bolstering of shattered nerves with stimulants and beverages, patent medicines, and s, all add their quota to the breaking down of the system.

can do a prodigious amount of work if he only with play which really amuses him, or if he sub- for mental occupation those which involve ercises.

called latent gout insomnia is a frequent symp- nsomnia may develop as the result of bad nervous Insomnia from whatever cause is followed by irment of nerve substance and an overloading ody with toxins. This continued nerve exhaus- ls to oxaluria, uric acid, gout, anemia, gastric estinal dyspepsia, muscular insufficiency, and l distress.

ver enfeebles the body by overtaxing the nervous

So, too, may mere indigestion, or the malfunction of any other organ, torpidity of the liver, a deficiency of the excretion of bile, which is generally accompanied by constipation.

The Symptoms of Neurasthenia.—The symptoms are essentially those of chronic fatigue, which has become exaggerated and pathologic. They may be classified as sensory, motor, psychic, and somatic. The sensory symptoms first noticed are those of generalized fatigue, with such localized sensations as headache, backache, and limbache. The motor symptoms are muscular fatigue, muscular weakness, and muscular exhaustion on slight exertion. The psychic symptoms are manifested by a diminution in the capacity for sustained mental effort and the spontaneity of thought and exhaustion after slight mental effort. The somatic symptoms show themselves in atony of the digestive tract and the circulatory apparatus, with disturbances of the secretions.

Headache is one of the most common symptoms of localized fatigue, and, associated with this, may be a sense of constriction about the head, and there may be either a sense of lightness or fulness of the head.

A woman who is chronically tired loses all her personal vigor, force, aggressiveness, and, above all, will power. Associated with this lack of will power are hesitation, indecision, a marked irritability, and timidity. Neurasthenic patients are subject to spontaneous attacks of fear, causeless in origin, and generalized in character. These attacks may be accompanied by pallor of the face and palpitation of the heart, just as in normal fear. The tired woman is a cross woman. The irritability shows marked impairment of the power of inhibition.

The Rational Treatment of Neurasthenia.—First of all, there must be a removal of the cause which has produced it. There are two distinct classes of cases—the overworked and the idle. The first class, and the most important to the world, are the overworked. We may have to deal with the intellectually overworked, in which the

verwork was combined with financial anxieties, difficulties, or lack of success in their work, or may have been the tremendous responsibilities ositions, which involved the lives or fortunes of ple. Added to this great strain and overwork, a lack of proper intervals for rest, recreation, , and the body has become a storehouse for vari- s, and so is suffering from both acute and chronic .

ass of patients must have the most rigid rest , such as was prescribed by Weir Mitchell years is most important that the patient should be from her old surroundings; if this is not possible, d be isolated on the top floor of the house with a e. The room selected must be bright and cheer- plenty of sunshine and fresh air; a window should practically all the time, for oxygen and sunshine f the best restoratives. The diet must be easily and very nutritious. The patient should be

the ships sailing lazily along, until the whole fades away in the distant horizon. In the vastness of the universe, the *ego* becomes contemptibly unimportant and insignificant.

After several months spent in this way the body has gotten rid of its toxins, nerves and muscles are rested, and through the soothing influence of nature the neurasthenic is gradually trained back to a healthier habit of thought and a more rational frame of mind. There is substituted for the morbid emotional complex a feeling of pleasure and energy. Reason and judgment reassert their sway; outdoor life quickens the perceptions, and forms tranquilizing memory pictures on the brain that return later to solace and refresh the individual.

There is another, and a very large class, of cases among women of leisure who have suffered all their lives from a lack of a vocation; they have nothing to think of except themselves. They do not know what it is to be quite well; they travel from one part of the country to another, and from one country to another, but they never rise above a certain level of invalidism. They are self centered, and what they need is the work cure. In the majority of cases, before these patients can be restored to health, powerful habits must be eradicated, new interests in others must be supplied to supplant the most intense egotism, new paths must be hewn out in the brain, the will must be recreated, and character can only be imparted by those who possess it.

CHAPTER VI

IENE OF THE MIND AND ITS RELATION TO THE PHYSICAL HEALTH

Temperament; Social Instincts; Fear.
velopment; Self-control, the Moral Sense, the Religious
Advantages of College Life; Balance of the Mental
Effects of the Higher Education of Women.
onment; the Choice of Friends; Literature.
r of the Will or Inhibition; the Effect of the Mental
he Physical Health; A Definite Occupation a Physical
Psychology of Success.

larity of brain and mind is an axiom of modern
nd it is a fundamental principle that must be
ntly in view in all physical and mental training.
soundness, inefficiency, and weakness of mind

Slight obliquities are what we most have to do with in education."

There are certain hereditary predispositions that will develop under certain conditions; some of them are good, some are evil; that is, with the natural development of the mind, certain peculiarities of the ancestors will be reproduced. The problems suggested are how the mind can best be developed, educated, and trained, so that hereditary weaknesses may be counteracted or held in abeyance, and that latent hereditary talents may be discovered and developed.

The first proposition that we have to face is that like produces like. There are modes of education, of conduct in life, and of occupation that should be avoided where a boy or girl is handicapped by a bad heredity. There are special precautions and attention to physiologic laws which would save the minds of many young men and women with a bad heredity from passing into a state of inefficiency and actual disease. Heredity implies only potentiality toward good or evil, and the latter may be averted by knowledge and the proper practice.

Temperament.—This comprises the general make up of the individual, the shape of the head, the appearance of the eyes, the mobility of the features, the texture of the hair and skin, and the kind of movement. The recognition of the kind of temperament, and a suitable training for its best development, is of the greatest importance in attaining good health and success in life.

There are four general types of temperaments—the nervous, the phlegmatic, the arthritic, and the scrofulous or lymphatic.

The nervous temperament has certain marked characteristics, as the small, wiry figure, the well-shaped head, the bright, restless eye, nervous bearing, highly strung and sensitive nerves, feeling pain keenly and bearing it badly. This woman is imaginative, sensitive, fo[illegible] intellectual work, often artistic and ambitious [illegible] the brain and mind are dominant above all el[illegible]

his woman will be difficult to bring up again to level. She will grow thin, dyspeptic, irritable, euralgic. She will be peculiarly liable to nerers.

perament has its special temptations—alcohol e drugs are two of them. Alcohol is not taken for social reasons, but for the effect of alcohol , and there is the greatest danger of becoming alcoholic habits, and finally of becoming an ble dipsomaniac.

matic or bilious temperament relates more to of the body, since in this class of cases the mind ed to the same dangers, but the oversanguine t has its own dangers, which may lead to lack eculation, and financial ruin.

itic have a predisposition to both rheumatism disorders, to which they are distinctly more others, and the fact that there is this latent ould be taken into consideration during childuth.

woman; nervousness, anemia, and mental depression follow.

That individual cannot be said to be healthy mentally whose social instincts are poor and perverted. Commonly one of the first symptoms of a disordered mind is the diminution of the social instinct. The insane are notoriously asocial.

Fear.—This is one of the most elemental and primitive of the emotions. Biologists assure us that fear and surprise were the first of the emotions to be developed, and that the feeling of the ludicrous was the last. Darwin says that the earthworm knows fear, and darts into its burrow like a rabbit when alarmed. So we see that fear is common to all forms of animal existence, even to the lowest. This universality of fear has come about through the working of the laws of natural selection, which prescribe that only those creatures shall survive that can best adjust themselves to their environment. Within limits, fear as a primary instinct has been and is eminently useful. It is the cry of alarm raised by the senses which act as guardians of the body, and, at a signal, in virtue of the nervous automatism, the organism is put in a position of defense. On the other hand, fear may serve to paralyze, as has been observed in the case of birds, many of which, though scarcely wounded by the small shot, fall to the ground as if struck by lightning, panting with wide-open eyes. In human life, while fear incites to activity, it may also paralyze that activity.

Mosso says that the fear that young children have of cats and dogs, before they have learned why they are to be feared, is a consequence of heredity. We are born to a heritage of fear. If we fear ghosts and demons less, we fear microbes and bacteria more. The professional or business man fears failure, but fear should be a guardian, not a jailer. A healthy fear of indigence will lead to thrift, industry, and such measures as will secure one's personal independence. Up to a certain point, fear is a protection, but beyond that it paralyzes.

Development.—We note that at birth the
ndless, and that the brain-cells, which are the
he mind, undergo their greatest development
dhood from stimuli coming from without the
e brain-cells possess infinite possibilities and
es. They are developed from the stimuli from
rough the eyes, ears, touch, taste, and smell.
other series of constant impressions which are
om within the body, and these come from the

pressions, conveyed to the brain-cells from the
from the outer world beyond the body, leave
istration, the writing on the brain-cells has
this constitutes memory; and the imprint on
is similar to that which type leaves of letters
n the page of the printed book. These printed
on the cells can be revived and seen and heard
tal consciousness, just as a printed book can be
seen and read by its owner.
ral qualities of the mind are imitation, acquisit-

opment of the mind, invokes the aid of biology to show that all children are but little animals, having no inborn notions of right and wrong, inheriting no sense of justice; savage, by nature, and predatory by instinct.

He finds a psychic justification for fighting among boys. "Fighting in some form," he says, "is one of the first means by which the mind becomes accustomed to intense action. To fight well, a boy must be capable of severe concentration of attention."

And he has found the age at which boys come to think that laws and the recognized rules of right conduct should be voluntarily respected varies from fifteen to seventeen years and older. These figures are approximately correct for girls.

Absolute truthfulness, square dealing, honesty, honor, and an *esprit de corps* should be demanded. Hitherto these principles have not been sufficiently inculcated in girls as the fundamental principles on which life must be met. The discipline has been too lax in the home and in the school; it is that of implicit and prompt obedience on the word of command; the proper subjection to and respect for those placed in authority; the kind of discipline given in business life, the hospital, and the army, and the lack of which has cost so much happiness and so many thousands of lives.

Self-control.—The perfect capacity for self-control in all directions and at all times is the ideal state at which we aim. It is the standard aimed at by developing the power of the will and the strength of inhibition. The great difficulties, the magnitude of the task, may be conceived of from the saying of the wisest of all men: "He who conquers his own spirit is greater than he who taketh a city." The reason is plainly evident—all the hardest battles of life must be fought out alone, there is a feeling of isolation, as if one were struggling alone against the combined forces of the universe, and, at the same time, there is going on the struggle for the mastery between the two conflicting natures, "When I would do good, evil is present with me."

concerted action there is a feeling of sympathy, ment from outside help, and the pleasant stim- ompetition.

were taught that certain enemies were going hemselves on the field, that they come for the the first instance single handed, and if grappled a time, and the contest between right, and lination, be then and there fought to a finish, sive time the conflict would be easier and the e certain; that in losing such a battle there s be a certain loss of self-respect, a feeling of ness, it may be even so slight a fault as the n of facts; while, on the other hand, a victory s something of the same feeling of exultation s in any fairly won contest or game. A feeling le superiority, of having one's self well in hand. l habits every gain on the wrong side undoes f many conquests on the right. The training ecomes the most vital of all problems. Noth- learned in youth is really so valuable as the

duty become active principles, dominating the character, There are yearnings after the ideal, an intense scorn of and hatred of evil. The purposes in life are then shaped. The impressions and resolutions then formed affect the whole tenor of the woman's life, as a rule, more than at any other time.

The capacity to feel pleasure reaches its greatest intensity. The sex relations are built up on safe and natural lines, regulated by family life, social feelings, and the carrying of the thoughts and the emotions into other channels, controlled by certain instinctive natural tendencies, by morality and religion. To think and feel properly should mean to act rightly as a physiologic corollary.

Music, literature, and art, imaginative works of all sorts, mix themselves up with the sex feeling, so that the two help to form the emotional nature. Far-away glimpses of poetic feeling, pleasurable altruism, citizenship, and patriotism show themselves in the earlier stages and give direction to life in the later. The whole period is one of immense importance for the health and happiness of the remainder of life, and the risks to the body and mind are then very great. A fact which is of great importance, and which is especially true of adolescence, is that it is possible by undue pressure to use up stores of energy that should have been spread out over very long periods. Through such overexertion in study or in games too heavy a drain is made on futurity, and mental disorders at this time are by no means infrequent, mental depression being generally the first to appear. This is more especially true in the descendants of neurotic families. The subjects are troubled with neuralgias, insomnias, and there is a pessimistic view taken of life.

The Religious Instincts.—Möbius says, "We reckon the downfall of religion as one of the causes of mental and nervous diseases. Religion is essentially a comforter. It builds for the man, who stands amid the evil and misery of the world, another and fairer world. Besides his daily careful life, it lets him lead a second and purer life. The

s of being within the hand of Providence, and
hope of a future redemption, is a support to
in his work and care, for which unbelief has
ation. Meditation calms and refreshes him
g bath. Worship breaks in upon the daily
his days with rest and meeting." The moral-
on suffers most severely through the downfall
n, as experience has always and everywhere

ous instinct has a very close relation to the
orals, esthetic feelings, to social instinct, and
feelings of reverence and awe, and the con-
the infinite in man are vague, but are the
ul parts of his nature.
urnishes the only pure ideals that half of the
cess to. It has proved an intellectual stimu-
sed a metaphysical frame of mind in some of
orous nations, such as the German and Scotch.
re toward refinement of life than any other
stimulates the benevolent and altruistic feel-

smoothed off. This, in addition to the discipline afforded by the college officers, and the total lack of discipline is the weakest point in the average girl's education. To be brought into intimate relation with the members of a large and educated community is in itself a liberal education. To learn to respect the rights and the opinions of others, to perceive that any given subject has a great number of points of view, is attaining toward a healthy mental balance that will make the woman broader minded, more sympathetic, more companionable, and more charitable in her views of life.

In addition to the regular college curriculum are the opportunities afforded, not only to special students, but to the entire body of students, for a liberal education in music and art, and so a broad foundation for general culture is laid that will greatly increase the opportunities for pleasure all through life.

So that, in addition to the actual knowledge acquired by a college education, there are also the advantages of the discipline of and development of mind and body; the knowledge of how and what is worth while to study; the power to study and solve life's greatest problems for herself and those dependent on her; the firm muscles, the clear brain, the steady nerves, the power of judgment, the control of the will, and the formation of character—on all of which the ultimate happiness and success in life depend.

Dr. Beard gives to brain workers a value of life of fourteen years above the average. The brain-working classes are less apt to worry, less apprehensive of indefinite evils, and less disposed to magnify minute trials than those who live by the labor of their hands.

Spinoza says that every advance toward perfection gives us happiness, and it is safe to say that the buoyancy which characterizes contemporary thought, the hopeful outlook amidst the dangers which threaten us, the sense of the added cubit to the man's stature, are due largely to the recognition of the power for good within his soul of which he was not formerly aware.

f the Mental Faculties.—There must exist a nce between the various faculties of the brain insure sanity. A high order of intelligence ch will, or keen emotions without a corres-ver of inhibition, and overmastering will and sense, vivid imagination without common se social instinct without much conscience, ous instinct without much sense of duty or ust invariably produce one-sided and unbal-duals, and the results would be bad for society; ny of these one-sided or unbalanced people r if not endanger the safety of the State.

ambition, misdirected energy, longing for the , regret for the unalterable, anticipation of ppiness, lack of a sense of perspective, fretting sentials, indecision, reopening of troublesome ready settled, avarice, selfishness, excessive ncontrolled passions, and the actual cultiva-melancholic state are some of the causes of ish and subsequent physical suffering.

has been looked at askance, and in this respect the position of the people of the United States was long peculiarly provincial.

To two men belong the great credit and honor of conceiving the idea of a liberal college education, and a medical college training, for women in this country.

In 1865 Mathew Vassar, "having recognized in woman the same intellectual constitution as in man," founded a college for women only, and thus gave women the opportunity for the same education that young men enjoyed at their colleges.

In 1850 the Woman's Medical College of Pennsylvania was incorporated. The idea of establishing a college for the medical education of women originated with Dr. Bartholomew Fussel, of Chester County. The query arose in his mind, "Why should women not have the same opportunities in life as men?"

Just how strong the public sentiment was against these movements, and the leaders of the opposition comprised the most prominent educators and physicians of the day, and what impediments they placed in the way, it is now difficult to realize.

The opponents of the higher education of women urged three final objections: First, women were mentally incapable of receiving the same kind of intellectual education as was given to young men at college. Second, they lacked the physical endurance to bear the strain of mental work. And, third, such an education would render the young woman masculine—she would no longer be willing to look after the ways of her house, her natural affections and power to love would vanish, she would become unwilling to marry and bear children.

Ex-President Eliot, of Harvard University, who has so long been the great educational leader in this country, in his paper on "The Higher Education of Women," says: "During the past thirty-five years three distinct apprehensions concerning the effect of the higher education of women seem to me to have been removed. In the

there was a perfectly sincere doubt (because ittle experience to go upon) whether young e so capable as young men of receiving what lled the higher education; or, in other words, young woman had the capacity to master by raditional subjects of the higher education. has been completely removed.

y, it was feared that if the young women the colleges three or four years, beginning ghteen years of age, that such study would s effect on their health and on their fitness tural functions in after-life. This apprehen- lt by many physicians and was warmly ex- or a whole generation we have been trying ent, and the result is perfectly clear. These ns have not been justified. It is apparent women can do much mental work for three rs between the age of eighteen and twenty- nly without impairing their physical vigor,

have some tendency to deprive them of their natural delicacy, refinement, and tenderness. It has not turned out so, and everybody recognizes that it has not turned out so."

When higher education, the professions, and industrial pursuits are all unquestioningly thrown open to women, then it can be reasonably supposed that they will come to possess those traits of mind—judicial, logical, creative, etc., now generally considered as masculine traits, and they will not only be more attractive and companionable for their husbands, but will be far more competent teachers for their children, their enlarged range of thought and vision inspiring greater confidence in their sons, and stimulating higher ideals in both sons and daughters.

The Environment.—As we have seen, the brain registers every impression from within and from without; if the impressions are those of discomfort, gloom, darkness, ugliness, those things, being inharmonious to the constitutional working of the brain, do harm and tend to set up bad habits. First, the body must be healthy, and the environment good in order to insure a healthy, vigorous mentality. Too much thought and care cannot be given to the environment of the child, youth, and adult.

Careful attention must be given to the toilet. The quality and condition of the underlinen, the cut and fit of the clothes, all tell on the mind. It has been said that a man tries to live up to his clothes; hence, the uniform of the soldier and the cassock of the priest. Clothes are not only an index of the character, but they help to make it. The clothing that comes into intimate contact with our bodies has a soothing or irritating effect upon the mind. It has also been said that for a woman to know that she was properly dressed had a soothing influence on the mind, second only to that of religion itself.

In the evening, laying aside the business suit of the day with all the anxieties and dust of toil, and replacing it by a tasteful house-gown, brings a sense of freshness that brightens the mind and stimulates the appetite.

g should always be suitable to the employment,
se, and to the surroundings, or good taste is
d, again there is an unhealthy reaction on the

a gloomy house, with a dull ugly wall-papers,
shine entering the room, may produce in their
want of appetite, interfere with nutrition,
gloomy, unhappy, and hard to live with.
tic surroundings render life happier, brighter,

nnot afford expensive paintings to hang on her
can select photographs of the old masters,
ed, which, placed in harmonious surroundings,
mind, cause a love of the beautiful, develop
and lay the foundation for a broad culture
crease the enjoyment of nature as well as of

ce of Friends.—We have seen that the impres-
yed to the brain-cells leave a fixed registration
lelibly stamped there. These may be called

is certain that either wise bearing or ignorant carriage is caught, as men take disease of one another; therefore, let men take heed of their company." And again, "'T is meet that noble minds keep ever with their like, for who so firm that cannot be seduced?"

Certain requirements and standards should be met, and the girl or woman should be sure that the individual, whether man or woman, comes up to the standards of her own clan.

A friend should be congenial, with similar tastes, opportunities, and training; frank in criticism, yet sympathetic in spirit; loyal and staunch in adversity, and one who disseminates an atmosphere which is broadening, elevating, and uplifting. Such a friend is to be desired and to be sought after.

Literature.—Not one of the least of the great molding influences on the mind and the social life of to-day is its literature, and the form of this which reaches the greatest masses of the people are the daily press, the literary magazines, and the modern novel. It is scarcely possible for the young to conceive the great impression which is made on the mind and character by the kind of books which they read. Carlyle said, "We cannot look however imperfectly upon a great man without gaining something from him." And to this statement might well be added, it is impossible for the mind to be brought into intimate contact with the lives of dissolute men and women, so vividly portrayed in many of the novels of the day, without being smirched by it. It is no more safe to read such a class of books, hoping to escape contamination, than it would be to live in the malarial districts of Africa, and hope to escape contracting that insidious disease.

However limited the geniuses may be in our immediate circle of friends, each of us may have for her most intimate friends the greatest geniuses the world has ever known, and have them at their best.

Two axioms should always be kept in mind—a real love

formed in early life or not at all, and to have riends one must own them, have them on her s, to take down and put up at will, to mark, to nd study. So whatever else one lacks, she ys have her own library, even if it is a limited

importance to the recognition of good reading sarily be a recognition of the limitations of one's Whether in the capacity of student, housewife, business woman, the time that can be devoted literature is very limited.

study of history and biography should always ion. It is a fundamental part of a liberal edunow something of the world's history, and the he English nation, as well as the biographies of d women who were such important factors in various epochs.

ld be followed by a study of the classics, and ion has not been liberal which has not included

desire for pleasure in the large and philosophic sense of the term. If this be so, then the education and hygiene of the emotions and impulses must be of the very highest importance in the life of each individual and in the social world. The question arises, and it is all important, can those inhibitory centers be so developed in youth, and so cultivated in life, that they can act as antagonists to what is morbid? Can they be used as direct preventive and curative agencies against tendencies and impulses which are foolish and hurtful? And the answer of educators, as the result of large experience and observation, is emphatically, yes.

But the training, to be efficient, has to be systematic, persistent, and along well-defined lines. The first step in this training must be the strict avoidance of all that has a tendency to lower the standards of morality, whether this is in the line of companions, literature, the stage, music, or art. To do otherwise is not brave, but as foolhardy as it would be for a weak army to advance against a powerful foe; it means annihilation or to be taken prisoners of war.

To overcome obsessions and delusional beliefs by volitional effort, the effort should be made to direct the mind to other subjects which have nothing whatever to do with the obsession, rather than to make a direct stand of the will against it, since the will may put forth its utmost strength in the way of direct repression of the temptation to any immoral action, and may entirely fail, while, by directing the same amount of force in changing the direction of thought, complete success may be attained.

The influence of the will upon the emotions is a matter of the highest importance in regard to the direction of the current of thought and the determination of actions. Control your passions; govern your temper. We can no more avoid feeling mentally hurt than we can feeling physical hurt, but we have exactly the same power of the withdrawal of the attention from the mental hurt as from the

, by determinately fixing it upon some other

ought, I can, I will," are, as has been well ly firm foundation-stones upon which we can empts to climb into a higher sphere of exist- first implies a faculty of introspection, the oral judgment, the third a consciousness of ct, the fourth a determination to exercise that

nce of the will on the conduct is first auto- gh previously acquired habits; second, through l state, and third, by our notions of right and the fundamental principles of living must be genuine consideration of the right of others. is an automatic reproduction of ideas, the of recording processes.

tion of the will, the power of breasting the e desires, and doing for long periods of time steful and painful, all tend to increase the hibition and strength of the will. Nothing

nervous mechanisms, profoundly affecting the secretions and the excretions, and stamp themselves upon the very tissues of the organism.

Of all the mental attributes the emotions are the most exhausting. A woman can spend more of her strength in five minutes of unnatural excitement than in a day of calm, steady brain work.

A perfect temper is not only a prime requisite for a club president, but for every man and woman in this hard workaday world, with its fierce competitions, its petty jealousies, and the stiletto practices of the cowardly, and it is one of the greatest preventives of indigestion, insomnia, and nervous prostration.

Forget your grievances. Every time that one repeats them to herself or to a friend she lives them over again, and the original trouble was but the merest moiety of suffering compared to a wound torn open afresh every day. To cherish a vindictive spirit does a vast amount of injury to the possessor of that spirit. In view of the facts of the beneficial effects of fighting upon small boys, and that the combative propensities of the Irish peasant commonly evaporates with his shillelagh, it would seem commendable to introduce boxing matches among women as a way to settle their differences.

From the standpoint of health, the intense excitement attendant on playing for high stakes, the loss of sleep, the unnatural life, the loss of money that one can ill afford to lose, must eventually lead to a serious if not to a fatal breakdown.

It is not the natural and reasonable intellectual work that injures the brain, but the various emotions—ambition, anxiety, disappointment, the hopes and fears, the loves and hatreds of our lives—that wear out the nervous system and endanger the balance of the brain.

Powerful emotion is like concentration attended with dissociation, it occupies the mind to the exclusion of all else, even to the dictates of self-preservation and reason.

more or less suspended and held in abeyance emotional states.

great concentration of the attention on one's occupation is a self-indulgence that often importance of the lighter side of life and the laims of family and friends.

bition and more philosophy would greatly number of cases of nervous prostration and ses. All of one's fortune is not staked on one dice; if the woman fails in one direction, there sources left.

tion of the mind on the physical suffering so-called habits in disease; there may have, lace, been a real physical cause. For example, jury to a limb followed by severe pain in that has happened that after amputation of the onsciousness of pain persisted in the brain. ional neuroses, the first cause may have been ical one, but the individual becomes so self- is with difficulty that the mind can be with-

of the heart's action and the circulation, the loss of appetite, the interference with nutrition, and the loss of sleep.

Worry is, as we have seen, in the first instance most frequently bred of exhaustion, but, if indulged in, it readily becomes a fixed habit, and the mind rapidly settles into a state of fixed gloom.

Worry is a type of fear. It is a futile regret over past mistakes and the miserable forecasting of the future. It has been called the great shortener of life under civilization—of all forms the financial one is the most frequent and, for ordinary minds, the most distressing.

Anxiety and the anxious frame of mind is in readiness to take fright in connection with our most vulnerable points on all occasions of apprehension or uncertainty. As no one's future can be clear throughout, there is never wanting the matter of anxiety to a mind susceptible of this state.

It is a significant fact that our asylums are recruited from the classes who spend their lives amid narrow monotonous surroundings; hence the large proportion of women, especially of farmers' wives, whose lives are probably the most narrow and the most monotonous. From this result the fixed ideas, the obsessions, and all the absorbing egotism of insanity.

With a variety of valuable and permanent interests, the mind is well safeguarded against attacks of worry. The overworked woman should increase her recreations, leave home for short intervals, travel, and have entire rest and change of scene. With increased vigor of body will come increased power of the will and the capacity to abolish worry.

Anger floods the brain with blood, and if the arteries are brittle, as they are in old age, and the individual is just as old as her arteries, the rise in arterial tension may result in the rupture of a blood-vessel, and the subsequent hemorrhage into the brain may cause an attack of apoplexy, paralysis, or even death. Attacks of anger

leterioration of the arteries; in this way anger own to cause death.

lent physical sensation will react on the lungs; ful normal emotion, whatever its cause, will ts influence felt on the respiratory functions. which is performed with tranquil breathing if free from care, quickly produces respiratory if the mind is brooding and preoccupied. ave acted as seconds in a duel to men accus-e use of the sword know that they become the duel much more quickly than they do in school.

g emotions make themselves felt in the respir-imals as well as of man. A sensitive horse, ly used at its work, or even roughly spoken to, mes breathless.

s incomparably less swift than the hare, but ch it; the fright of the hunted animal disturbs g and robs it of much of its strength.

It is not only profoundly true that mental attitude has much to do with bodily function, capable of producing changes in its nutrition and secretion, but we may go further and say that healthful and hopeful habits of thought do much to put the body on the defensive against the assaults of disease.

Mental attitude refers not to the will or the emotions, but to the mind in its entirety. The trend of a woman's thoughts, the use she makes of her intellect, the strength of the volition, the sense of responsibility, and the objects of her life are all questions that have a distinct bearing upon the bodily functions and the health of the individual.

A Definite Occupation a Physical Necessity.—It is now generally conceded by the leading sociologists of the day that women who are not engaged in the duties of maternity need the same intellectual and industrial activities as men. Many go further, and it is their opinion that there is no reason for excluding women, who are fulfiling the duties of maternity, from exercising full intellectual and physical activities in other directions. And the proof that this is not a mere theoretic assumption is to be found in the fact that many women have not only given birth to a family of children, but have successfully reared them, and, in addition, have been eminent in other pursuits and callings. Well-known illustrations of this fact are to be found among the most noted sovereigns that Europe has ever had—Catherine de Medici, Maria Theresa, Catherine II of Russia, and Queen Victoria.

Pleasure seeking, as the end and object of life, leads to ennui, disgust, and physical and mental deterioration, while the slavery of housework, the childish vanities, and petty cares and vexations are most injurious to the nervous system, so that for the life of the housewife the education preceding it should be broad; and the more highly educated the woman is, so much the more effectually can she free herself from attaching too much importance to every little detail, and so neglecting what is higher and more important, and it will be a great preventive of irritability of

arrelsomeness, and even melancholia and
ngement, from which so many of these women
sequence of the monotony of their lives.
l when she leaves school, which she should
e very alphabet of her education, should
elf for some definite occupation, just as her
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in answer to the question as to how the
he mind can best be developed, conserved,
he best use of for life's work, says: "It is a
ate thing, if, during the later period of ado-
occupation in life has been selected which
the capacity of the individual and goes with
endencies. The seriousness and the settled-
life of the period, with the bracing of every
inew to do the work, to gain a reasonable
ociety, and to enjoy a fair amount of happi-
tself a tonic of no mean value, while over-
dy and mind is always a risk, as well as an

"The American woman of the better class has superior rights and no duties, yet she is worrying herself to death; not over specific troubles, but because she has lost her connection with realities. Many women, more energetic and more intelligent than their husbands or brothers, have no more serious occupation than to play the house cat, with or without ornament. It is a wonder that more of them do not lose their minds; that more of them do not break with the system entirely, is due solely to the inhibitive effect of early habits and suggestions.

"The remedy for the irregularity, pettiness, ill health, and unserviceableness of modern women seems, therefore, to lie along educational lines. Not in general and cultural lines alone, but in a special and occupational interest and practice for women, married or unmarried. This should preferably be gainful, though not onerous or incessant. Normal life without normal stimulation is impossible, and the stimulation best suited to the nervous system is some form of interesting work."

The Psychology of Success.—Success has been defined as the accomplishment, the realization of what has been willed or wanted, the ripe fruition of the well-tended tree. The achievement of fame or fortune is what the world generally regards as success.

Before entering on an enterprise, all the premises in the case must be had in order to form correct judgments, otherwise incomplete and imperfect knowledge of the case will lead to error in judgment, in which there could be said to be "no *chance* of failure, it was a certainty."

An element that always makes for success is to be able to supply a want of the public; it is partly a question of demand and supply. It is sometimes possible to create a demand. But, as a rule, success is the fruition of patience and well-directed energy.

There is nothing which tends so much to the success of volitional effort as the *confident* expectation of its success, while nothing is so likely to induce failure as the appre-

t. Since the tendency of the cheerful and ons is to suggest and keep alive the favorable , while that of the depressing emotions is ore the view all the chances of failure, the increase the power of volitional effort and ll diminish it.

al condition also exerts a direct influence hysical powers, through the organs of the nd of the respiration, the heart's impulse being us and regular, the aëration of the blood efficiently performed, in the former of these an in the latter.

o easily won, or won early in life, may really f failure, because, having been once achieved, al may be content with what she has and to higher development. And so a very ess may be the tomb of energy and the of ambition, instead of a stimulus to higher

uccess may also be caused by indulgence or

There are four mental requisites necessary to the achievement of success, namely: a clear view of the end; a judicious indifference to the sentiment around by the sweeping away of obstacles; an indomitable energy; and the power to resist the temptation to rest on the soporific plane of mediocrity.

CHAPTER VII

HE FUNDAMENTAL CAUSE OF WOMAN'S PHYSICAL DETERIORATION

ory of Woman's Dress; the Corset in History; the
inst the Corset; the Influence of the Corset on the Female
Curved Front Corset; the Relation of Corsets to Ab-
Pelvic Disorders; the Effects of Corsets on the Muscles;
Front Corset; the Abdominal Corset; the Wearing of
oung Girls; What Style of Corset is the Least Injurious.
e Stockings; the Essential Qualities for Winter Under-
Length of the Walking Skirt; the Winter Street Dress.

UL study of the history of woman's dress affords
lemonstration of the fact that the fundamental
he inferior physique and lowered vitality of
n woman of civilization is to be found in not

PLATE II

Greek costumes. "Queen and two attendants."

ancient Romans was not essentially different—was very simple. It often consisted of a simple garment, the tunic, which pleased the eye by the gracefulness of its drapery, and at the same time was comfortable by reason of its looseness.

The chief and indispensable article of female dress was the *chiton*, or tunic, consisting of one piece of material, sewed together in the form of a sack, open at top and bottom, in height reaching from the neck to the feet of the wearer, and in width equal to that of the extended arms. Within this stands the figure, and first it is girt around under the breasts by a girdle, to keep it from falling; next the upper edges are fastened together on the top of the shoulders by a brooch, and the arms are either left bare, pressing down into folds at each side the masses of material, or these masses may be gathered around each arm, and fastened down the outside with buttons and loops, so as to form sleeves.

To secure greater warmth on the breast and shoulders the chiton was made long enough to be doubled back at the top, and this part reached to the waist. Underneath the chiton was worn a band of cloth, to support the breasts, and, in addition to this, a cord was sometimes crossed round the breasts outside the chiton, to assist either in supporting them or in bringing out their form. Round the loins was sometimes worn either a short petticoat of thick woolen stuff or a sort of bathing drawers, such as acrobats wore. This was all of the essential dress for indoor wear. The chiton was made of a variety of fabrics, though generally of linen.

For outdoor wear was the *himation*, a garment also worn by men; it was made of woolen stuff and was worn like a plaid.

The chiton and himation, as above described, continued to be the standard dress from 450 B. C. onward.

The hair was most usually worn gathered back from the temples, and fastened in a knot behind by hair-pins of ivory or bone, either plain or mounted with gold.

feet, sandals were usually worn, in exceptional
, and for hunting, high boots. Gloves were
by the Greeks, except to protect the hands in

time of Pericles, the great European distinc-
n male and female dress consisted in the length
old men, priests, and officials being allowed the
wearing long or women's skirts, and young
permitted to wear the short or man's skirt.
Romans, this single garment, worn by both
called the toga.
olled on, this loose cord, which had formed the
reinforced by a broad belt or band to support
. Among the Assyrians this belt was made of
en or thin metal; the Egyptians wore a folded
d belt for supporting the breasts was also worn
nan ladies. But whatever the material used,
lt does not show any signs of tight laces or of
s of iron or bone. It was, however, the fore-
stays," and when the moral fiber of the Greeks

the southern nations of Europe in their decadence were the short skirts and jackets clinging to the limbs, which were worn by the hardy nations of the North, who were given to constant fighting and the pursuit of the chase. The Norman lords, following the fashion of the south, swept about in long tunics and flowing robes.

In the twelfth century the Anglo-Saxon women, dressed in their loose garments, were indebted to the Norman ladies for the introduction of "stays," and the fashion of tightly lacing the body with a robe, laced down in front in order to show its undulations, as well as the use of cosmetics.

In the household register of Eleanor, Countess of Leicester, which bears the date of May 24, 1265, is one of the earliest places in which the word *corset* occurs. The word is again found in reference to the wardrobe of Richard King of the Normans, and Edward his son. Corsets were at this time worn by men as well as women.

The author of the life of St. Thaïs, who lived in the twelfth century, tells us that the French were so tightly laced that they could bend neither their bodies nor their arms.

Peter the Great wrote that the robes are so tightly stretched over the body, that the ladies can scarcely breathe in them, and often suffer very great pain in order to make their bodies slender.

It was in the thirteenth to the fourteenth century that the last trace of the Roman drapery gradually disappeared: the women adopted for the most part the robes with the tightly fitting corsage, leaving ordinarily uncovered the neck and the skin of the breast; this closely fitting corsage was closed in the back by lacing.

Boots and shoes of this period had their pointed toes made two or three times the length of the wearer's foot. The fashions of England were the same as those of France, though apparently they were not carried to quite the same excess as on the continent. The singular aim of each sex was not only to emulate the other in the sumptuous style

its profuse adornment, but also to imitate the ion of the other's attire; this obtained in both

issance.—In the sixteenth century a distinct etween ancient and modern dress took place, ent fashions took their origin from about that during this century that men adopted clothes about the body, overcoats with tight sleeves, h more or less rigid brims, and closed boots 'he women also wore their dresses tightly figure, with tight sleeves, low-crowned hats, rimmed petticoats. These garments, which from antiquity, constitute, as it were, the e, from which has risen the endless variety ale and female dress.

e the general resemblance between the cloth- o sexes, which may be traced to the earliest ne decided. After the accession of Queen 1558, the well-known costume, associated rom about the middle to the close of her reign,

clothes were not wanted for the concealment of the person, but to make more prominent the curves and undulations of the figure. The ruff grew out of a scrofulous complaint on a royal neck; the hoop-skirt, to conceal the *enceinte* condition of a French queen.

The Corset in History.—Dr. Bouvier divided into five epochs the transformations undergone by the corset, or by that part of the clothing which took its place from earliest antiquity to 1853.

The first epoch is that of antiquity; in this, as we have seen, the band or girdle, which was worn by the Greek and Roman ladies, was the forerunner of the corset.

The second epoch comprises a great part of the Middle Ages. This was a period of transition which partook of the styles which preceded and followed it. At first there was an abandonment of the narrow Roman band, and later the introduction of the corsage fitting tightly about the body.

The third epoch embraces the end of the Middle Ages and the first part of the Renaissance, which was marked by the general adoption of robes with a very tightly laced corsage.

The fourth epoch is that of the whaleboned corset, which extended from the middle of the sixteenth century to the end of the eighteenth.

The fifth epoch is that of the modern corset.

The busk, known since the fourth century, was introduced into France in the sixteenth century; men also wore busks or stomachers. The busk relates closely to the history of corsets. The middle of the sixteenth century is the epoch of transition from the corsage to the whale-boned waist, which constituted a sensible approach to the modern corset.

We find that the reign of Queen Elizabeth was marked by the first use of the whalebone stays. These were much affected by her successor James, who insisted that all his courtiers, male as well as female, should cultivate the appearance of the wasp.

of George II, represented in Hogarth's
id to have been one of the most harrowing
torture. We are told that the doughty war-
vus Adolphus wore stays almost to a man.
ine de Medici is generally attributed the
of the closely whaleboned waist into France,
et which she invented resembled in more
hat instrument of torture—"The Machine
Inquisition." This corset was made of steel,
nflexible as a suit of armor, and, like a war-
plate, consisted of two pieces. It opened
by hinges, secured by a hasp and pin,
ordinary box fastening. In the front and
bar of steel projected in a curved direction
nd on their bars depended the adjustment
eaked body of the dresses and the set of the
During the forty years in which she ruled
teen-inch waist measure became the accepted

Sévigné, born thirty years after the death

portions, to reform nature, and prevent her mistakes, and one could never take too much care to obtain such laudable ends. Mothers would have been considered culpably indifferent of their children who had neglected these first indispensable cares for the regulation of the formation of their bodies.

The Crusade Against the Corset.—From the time of Galen, 130 A.D., to the present day, in spite of the anathemas hurled against it by the state and medical profession, denouncing this great injury which woman does herself, has the corset still prevailed.

In the thirteenth century, Henry III, having permitted its use for some time, proclaimed a very severe edict against the wearing of corsets, which was considered so pernicious to the health of women, but of no avail.

In the fourteenth century an edict was issued by the Emperor Joseph of Austria, forbidding the use of corsets in all nunneries and places where girls were educated, and calling upon the Church to aid him, threatening excommunication to those evil-disposed damsels who should persist in operating upon their waists. The College of Physicians of that day took up the subject with activity and zeal, and dissertations upon the evils of tight lacing were scattered broadcast.

Professor Virchow, that eminent pathologist, wrote, "What is the use of introducing the principles and appliances of hygiene into the huts of the poor and ignorant, when the scions of wealth and pretended intelligence, especially of the gentler sex, show their contempt of hygiene by their dress and general wearing apparel. In days gone by I have battled against that diabolical invention called the corset, but this crusade has been given up by me as absolutely futile."

The modern hygienist has taken the stand that, since the corset cannot be suppressed, it *must* be reformed. About 1880, for the first time, some attention began to be given to the hygienic consideration of the style of the corset.

The Influence of the Corset on the Female Body.—As a result of the four hundred years in which the corset has molded the plastic form of woman, she has become physically so degenerated that it is necessary to have recourse to the artifices of the modiste in order to have even the appearance of a good figure, and the support afforded by the corset to maintain the erect position.

The modern corsets, made of one piece, can be classified in three categories, according to the region of the body

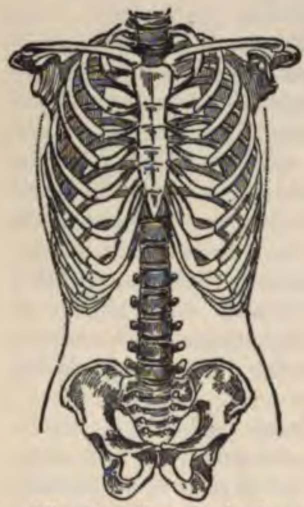


Fig. 13.—Normal chest.

Fig. 14.—Effects of tight lacing on bony thorax.

on which they exert the greatest pressure. First, the "curved front" corset, enveloping the thorax and abdomen, but making the strongest compression at the base of the thorax; second, the "straight front" corset, enveloping the thorax and abdomen, but making the strongest pressure upon the abdomen; and third, the "abdominal corset," only embracing the abdomen, and supporting neither the breasts nor the base of the thorax.

In studying the effects of the corset on the body they will be considered in this order.

The Curved Front Corset.—The corset is applied to the trunk of the body, consisting of the thoracic cavity, a distensible cage containing and filled by the heart and lungs; second, the abdominal cavity, whose walls are almost wholly composed of muscles, and containing the liver and the entire digestive apparatus; and third, the pelvic cavity, whose walls are partly bony and partly muscular.

When the anterior wall of the body is forced to take the shape of this curved corset, it is pressed back toward the vertebral column, and even when the corset is not laced tightly, there is always more or less constriction of the base of the thorax, so that a serious deformity of the lower part of the thorax and abdomen is produced; instead of the normal outward curve of the anterior surface of the body, with its most prominent part in the region of the umbilicus, there results a broken line at the waist, and an obtuse angle is formed here, pointing outward. This causes a marked incurvation of the lower part of the chest and its approach toward the spinal column, with a corresponding flatness of the chest and lessening of the respiratory capacity of the lungs, and the action of the heart is seriously interfered with.

The chest or thorax is forced into the shape of a cone, the lower opening is narrowed, and its walls are brought too near together. The lower ribs become too short, and, if the corset is worn early in life, the upper ribs become too long; and the thorax as a whole is too long.

The greatest constriction produced by the corset occurs in the plane extending from the ninth to the twelfth ribs, which corresponds to the position of the diaphragm, stomach, and liver.

Just how seriously the curved corsets interfered with the expansion of the lungs was shown in a paper published by Dr. Sargent in 1889. He found that the average lung capacity when corsets were worn was one hundred

ur cubic inches; when corsets were removed, owed a capacity of one hundred and sixty-inches—a gain of thirty-three cubic inches; ets crippled the lungs to the extent of one-entire capacity.

leavors to make up this loss by the increased he heart's action and more frequent respirations, but this is at the expense of greater wear and friction of the machinery. Palpitation and shortness of breath follow, and the woman is obliged to give up all active exercise.

Through this failure of the suction power of the heart there result disproportionately larger lower limbs and an accumulation of adipose tissue

which aids in the digestion of food and in the unloading of the bowels, and, at the same time, the pelvic circulation is interfered with and pelvic congestion is favored.

The direct pressure of the corset upon the side walls of the chest forces the ribs in upon the abdominal contents; the liver suffers most from this, and not only does the liver sometimes actually show furrows upon its surface from the pressure of the ribs, but, in the postmortem room

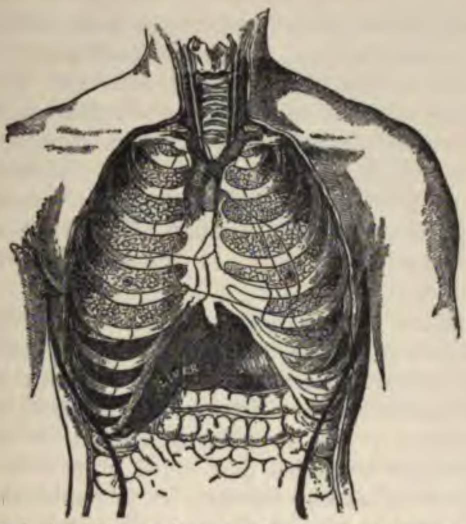


Fig. 16.—Relation of bony thorax to lungs, heart, liver, and stomach, with artificial outline produced by corsets (after Gray).

of the great Vienna Hospital deep grooves upon the liver were repeatedly found with great distorsions of the body caused by the corsets, and, in a few instances, the left lobe of the liver was found to be nearly separated from the right.

By the constriction of the waist, the liver and all the abdominal contents are pushed downward below their normal position, and their functions are greatly interfered with. The effects of this pressure upon the stomach

astrous, and cause a host of digestive and ner-
es. There is very frequently a prolapsus of
; the right one is more frequently prolapsed
t, owing to the relation of the right kidney to

y of 50 cases Dr. Gallant found that in 90
e stomach was pushed down below its normal
80 per cent. there was prolapsus of the right

riction of the waist crowds the small intestines,
companying mesentery and colon, into the
rectum is loaded with feces and the bladder
re follows an anterior displacement of the
the other hand, the rectum is empty and the
ended, there is a backward displacement of
In very many of these cases the compression
tion are great enough to interfere with and
peristaltic action of the intestines, and con-
produced.

muscles of the back leads to their atrophy, and, as it is their function to hold the spinal column erect and to approximate the shoulder-blades to the thorax, when they become atrophied the bony parts become much more salient. Further, the corset, in weakening the muscles of the dorsal region, interferes with the normal forward projection of the chest, and so leads to its flatness.

The corset atrophies the articulations of the vertebral column, produces a round back, an inequality in the height of the hips and shoulders, with the resulting familiar awkward, waddling gait.

When the healthy skeleton offers to the muscles of the body a solid base of support, the action of the muscles of the back are not interfered with, there is nothing to prevent their contraction, and the body is held erect. With a perfect muscular development, the shoulders are effaced, the back is admirably straight, and the carriage is erect and graceful.

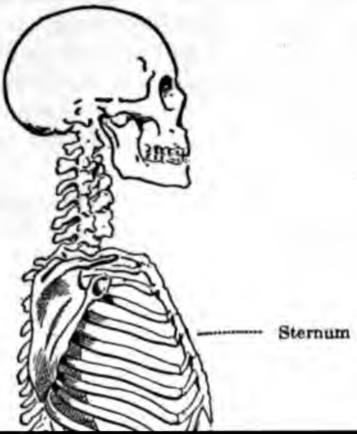
The strong compression of the muscles of the abdomen not only destroys the normal contour of the body, but, by the atrophy of the abdominal muscles, a partial paralysis is caused, and so the support which should be afforded the viscera by these muscles is weakened, and a prolapsus of the abdominal contents follows.

It will be seen that the two bony cavities of the body are connected in the back by means of the vertebral column and are not immovably fixed in relation to each other, but by reason of the flexibility of the spinal column, they can be approximated or the distance extended. The suppleness which results from this mobility corresponds to the physiologic needs, and constitutes one of the most essential conditions for gracefulness of carriage.

The movements of extension of the chest are rendered possible by the action of the muscles of the back, which hold the trunk erect and extend the vertebral column.

When the corset is applied, the compression and constriction fix all those portions of the muscles at and below the waist; the action of the muscles between the chest

s diminished at least one-half, so that these ome atrophied from disuse, and when the man wishes to straighten up the movement cuted by the entire trunk.



Whereas, with the corset on, the pelvis is immobilized, and it follows the movements of the thorax. The movement of extension of the thorax, instead of taking place in the region between the false ribs and pelvis, take place at the hip-joints—the vertebral column remains rigid, it takes no part in these movements.

Then, as a result of the incurvation of the anterior surface of the trunk, there is an interference with the

Fig. 18.—Muscles of the anterior surface of the trunk (O'Followell).

movements of extension of the spine and its immobilization, which causes the propulsion forward en masse of the abdominal contents. The anterior portion of the chest is shortened, and an exaggeration of the sacro-lumbar angle is produced.

On the sides of the body lateral flexion of the trunk is possible, through the contraction of the muscles between

nd pelvis, but with corsets on this is impossible. avities are fixed by the rigid armature which he corset. This not only prevents the lateral the body, but also causes an unnatural depres- the crests of the ilium. The waist is con- such an extent that the woman can only fasten her corsets in front by having them widely separated in the back.

All these conditions cause a complete immobilization of the thorax on the pelvis, so that the movements of the upper part of the body are characteristic in corseted women, and she moves all in one piece.

The Straight Front Corset. —This corset, when worn loose, is a great improvement

By having the base of support from the bony pelvis, the chest is left free, and a good chest expansion and its throwing forward is favored, and at the same time an erect carriage is secured.

The waist-line runs below the short ribs, which lengthens the waist, producing graceful lines without compression.

But not all straight front corsets fill these conditions. Unless sufficiently long and well fitted about the hips, they may fail to raise and support the abdomen, and when too tightly worn may press too strongly upon the abdomen in the pretext of obliterating it, with the result that it is placed in a vice from before back. Pressed down, the intestines find a means of escape at the lower border of the corset.

The front of the corset is frequently carried too high up, and does not leave the epigastric region sufficiently free. The corset must absolutely not be thoracic, and must definitely renounce the support of the breasts, which should be accomplished when necessary by an extra bust supporter. The long straight corset immobilizes the trunk in the same manner as the curved front corset.

The Abdominal Corset.—In 1902 Madame Gaches-Sarraute proposed to abandon the thoracic corset and to introduce instead the abdominal corset. This corset embraces the pelvis without compressing it, and takes as the foundation of its support the bony girdle; the plan of the line of support is oblique, and inclined forward in such a way that there can be no compression.

In this way the pressure, instead of coming from above and annuling the contractions of the abdominal muscles, comes below and reinforces their action; the stomach resumes its normal position, and is supported in the plane of its greater curvature, facilitating its functions, so that digestion will be performed under the most favorable conditions.

The abdominal corset should not exceed the height of the false pelvis, should have as the base of support the bony

pelvis, and should be rectilinear in front ghtly curved in the back and below. The be simply surrounded and their projection A curve which follows the normal sinuosity of this plane joins the piece from the hips with that of the abdomen.

The part corresponding to the back must be sufficiently wide and free, so that the posterior borders of the corset will be parallel when it is put on, and the plane preserved for the back in the pieces which form the corset. This garment will be adjusted without strain in the back, and it will embrace the form of the body so exactly that it can be put on without being unlaced.

in their action, by the use of the corset. The earlier the corset is put on, the more pernicious will be the effects, because during the period of growth the bony framework is more pliable and delicate, so that a relative slight compression is sufficient to make an indelible impression upon the form. Before the complete development of the hips and the entire bony framework an enormous amount of harm is done by the wearing of corsets.

In early youth the heart lies higher than in the adult. By narrowing the intercostal spaces, the heart is retained, as it were, in its youthful position; in the adult female the heart is found to lie higher than in the male, and the contraction of the space in which the heart has to play is one of the causes of woman's fainting, and it is also a cause of organic disease of the heart.

At puberty, when the girl is rapidly increasing in stature, and her menses begin to be a drain on the system, relentless custom adds the compression of the corset and long skirts, suspended from tightly drawn bands around the waist.

The spinal column at this age lengthens rapidly, and it should carry upward all the viscera attached to it; but, owing to the weight of the clothing and the compression at the waist, this normal process cannot take place; instead, there is stretching of the ligaments, and the viscera are prevented from rising and hang at a level much below the normal.

A girl of this class is apt to be slender, with undersized hips, and has a characteristic configuration of the anterior surface of the body, a hollowing out of the region over the stomach, and a very great protrusion of the abdomen.

The uterus remains undeveloped and in an infantile state until near the approach of puberty, when it develops rapidly, and continues to increase in size until the normal size is attained—about twenty years of age. By the putting on of corsets the free mobility of the uterus and its appendages and their normal development are interfered with.

›d of growth and development is one of the
›ortance for the future health of the woman,
lly and mentally, and the most intelligent care
ven the girl at this impressionable age. By
ets on their daughters at this time, mothers
em a very great wrong, which can never be
ed for. The corset prevents growth, develop-
e participation in those exercises which make
vigor and good health. To the well-developed
re as much of a superfluity as crutches would
ing but the prevailing style of dress causes
them on.

n suggested that the wearing of any kind of
re thirty years of age should be a penal
in case of a minor, the parents should be
e hundred to one thousand dollars.

the wearing of corsets after the age of thirty,
livided into three clases—first, those who
emn their use; second, those who approve of
, those who tolerate the wearing of corsets.

46.4 per cent. In proportion to her height the hips of the modern woman exceed the girth of those of a man by about four inches. and a woman of the same height as a man exceeds in hip girth by six inches. If the muscles which pass from the thorax to the pelvis were properly developed, the artistic proportions would be preserved, and the waist of the woman would be proportionately larger than those of a man.

The ideal figures of the Greek women show a torso bounded by outward curves, softly melting into one another, until the broadest part is reached at the hips, thence again declining to the feet. The line from the armpit to the ankle is one of the chief lines of beauty in sculpture, while the anterior surface of the body should present, in the median line, a gentle curve from the upper end of the breast-bone to the brim of the pelvis, the convexity of the curve coming about the umbilicus. An inward curve of this line is a deformity artificially produced.

In order that the corset should become an inoffensive garment it must be well adapted to the figure, so that it shall not embarrass the action of the diaphragm or the vital organs or the movements of the body.

The injurious effects of wearing the curved front corset have been given, and this style of corset should be condemned without appeal, since its use is dangerous from every point of view.

The straight front corset is much less injurious than the curved front, but its use is detrimental to health, and prevents the free movements of the body, so that the abdominal corset remains the only one which is perfectly safe and at the same time esthetic.

The chief rôle of the corset must be to sustain the clothing and to prevent the constriction of the lines about the waist and to prevent the falling of the viscera.

This can only be accomplished by selecting the proper points of support for the corset; this is in the lumbar region of the spine and the crest of the bony pelvis, a region of several centimeters in height. Except for the vertebral

e viscera of the region immediately above this
ny protection, and are subject to the greatest
constriction, the organs being piled up on top
er, as it were, and thereby suffer very great dis-
and impairment of function, while, on the other
solidity of the bones of the pelvis permits of
a base of support for the corset, as well as for
g.

ed on this idea that the hygienic abdominal
built, and, further, this style of corset does not
e normal curve of the anterior surface of the
at the abdominal corsets do not support the bust
ment, as the woman with very fully developed
wear a bust supporter, entirely separate from
and in those pathologic conditions of ptoses
minal contents—and from an orthopedic point
e abdominal corset affords an excellent solution.
to prevent misfits, all corsets should be made to
measurements must be taken with the corsets
The corset must be shaped so as to fit exactly

from below up. After the stocking supporters have been attached, the lower part of the corset is held down with one hand, while the other hand gently draws up the abdomen by means of drawing on the undervest, or slipping the hand within the corset; in this way the abdominal organs are lifted up. The corset is then laced from its lowest point to the waist-line, and from the top to the waist-line, in such a way that only one long "V" is formed. The laces are then firmly tied and slipped in under the corset.

Corsets that slip up are probably either too long waisted, too tight over the fulness of the hips, or there is not sufficient curve in the back and sides at the waist-line. High-backed corsets are apt to make the woman look round shouldered, while a low back gives smoother and more desirable lines.

The Shoe.—The style of the shoe is very closely related to the corset in the amount of harm it is capable of doing. Considering the fact that the feet form the base of support for the entire body, and that on their condition depends the woman's ability to take a sufficient amount of exercise and maintain her good health, surprisingly little attention is given to their care.

The compression of the foot into a rigid body, not unlike the shoemaker's last, destroys the natural relation of the parts, prevents the growth, interferes with the circulation, compresses the nerves, weakens muscles and ligaments which should support the arch, and is the prolific source of corns, bunions, weak ankles, and "flat" foot.

But, in addition to the direct injuries to the feet, the excessive elevation of the heel displaces the center of gravity, and transfers the weight of the body for the most part from the heel to the line of union of the instep with the toes, a series of joints with shallow sockets not formed to bear the brunt of the body weight. In addition to which the equilibrium of the body can only be maintained by an increase of the natural curves of the bony framework, with the resulting increased curvature forward at the small of the back, is an increase in the

of the buttocks and abdomen. This tilting he pelvis interferes with the circulation of the , and their congestion and inflammation follow. ng around in her bedroom slippers any one onvince herself of the greater grip that the the floor when so clad, and of the greater reness in walking; this is chiefly due to the dth of the sole, and the fact that the slipper The greater firmness of men on their feet pavements is doubtless due to the difference f the shoe and the lower and broader heel.

part of the sole of the shoe must be so de- the great toe will retain its normal position the inner border of the sole. In many shoes e is forced out of its natural position toward of the sole, and the tip, instead of pointing ward, is thrust toward the line of the sole. ly lessens the thrust of the great toe as it ound in walking, but also leads to a malforma- foot and ingrowing toe-nails.

heels force the foot to keep perpetually and unnaturally on the stretch; if they are worn in early youth, they may bring about permanent deformity of the skeleton and of the foot. Moreover, the high heel interferes with the natural walk, in which the pressure of the foot on the ground passes from the heel to the toes. The high heel requires that the front of the foot should be set down first instead of the heel. The result is an awkward tripping gait and a short step, which is very fatiguing. This is one of the causes for woman's frequent dislike for exercise in the open air, such as walking, mountaineering, games, etc., and so the general health is affected.

Again, from the esthetic point of view, the size of the foot must be in proportion to that of the body. Artists declare that every foot that has worn a shoe is deformed, and so, when they wish to make a study of the foot, they go to the shores of Italy, where the peasant women have never worn shoes.

Paget's description of a perfect female foot is great breadth and fulness of instep, a well-marked great toe, a long second toe, projecting a little beyond the great toe, and a very small little toe.

Since the feet are the part of the body to come in direct contact with the greatest amount of cold, whether on the floor of the house or the pavement of the street, it is a matter of prime importance to the entire body that they should be warmly clad. While for house wear and in the summer time a French kid is a most comfortable shoe, for street wear and outdoor exercise in cold weather a heavier leather with thick soles is requisite as a protection against the cold and damp.

Rubbers should always be worn when the pavements are damp, even if it is not raining, and in snow-storms and very heavy rains cloth gaiters should be worn over the shoes, to keep the ankles dry, and later to protect them from the wet skirts.

The Stockings.—Great care must be taken to have the foot of the stockings sufficiently long and loose; this

ie case with woolen stockings, which are apt much in the wash. A too tight or too short ie stocking interferes with the circulation and ld foot, and when the stocking foot is too oduces the same deformities that too short a

ble generally begins in childhood; mothers ying stockings for their children that stockings he laundry and that children's feet grow. that the stocking-foot is apt to be too short worn out, and so the toes are bent or cramped d there is the starting-point for deformities s well as corns and bunions. As much harm rom wearing too short a stocking-foot as too

th the present mode of wearing the stocking ttached to the corset, or, indeed, one of the f the stocking-supporters may be said to ing down of the corsets, the supporters are or this purpose, and as a result the entire

normal body temperature and the excretion of certain effete matters in the form of watery vapors.

In the temperate zones two qualities are required of underclothing—that it shall prevent the too rapid radiation of heat from the body and that it shall be absorbent. No material is warm *per se*. The warmth is necessarily derived from the body, so that what is required of the underclothing is that it shall confine the warmth in its meshes; atmospheric air being one of the poorest conductors of heat, the material should be so constructed as to imprison a considerable quantity of air in its meshes.

The second necessity is that the excrementitious matters should be rapidly absorbed, as they are being constantly poured out from the skin, so that the material must be absorbent in the highest degree, otherwise the fluids remain in contact with the skin to irritate it, and the atmospheric air confined between the undergarment and the skin rapidly becomes surcharged with gases and moisture, and so acts like a warm jacket around the skin. Heat radiation is interfered with and the skin becomes extremely sensitive to changes of temperature and to drafts.

Wool is a poor conductor of heat and a great absorber of water. Its powers of hygroscopic absorption is at least double in proportion to its weight, either cotton or linen, and this property is an important one. During perspiration the evaporation from the surface of the body is necessary to reduce the heat which is generated by exercise. When exercise is finished, evaporation still goes on, and, if unchecked, to such an extent as to chill the body. If dry woolen clothing is put on after exertion, the vapor from the surface of the body is condensed in the wool, and gives out again the large amount of heat which had become latent when the water was vaporized, and from this cause alone a woolen covering feels warm during sweating. In the case of tightly woven cotton and linen fabrics, the perspiration passes through them, and evaporates from the external surface without condensation; the loss of heat then continues.

to this, the texture of wool is warmest from
ucting powers, and it is less easily penetrated
s. The more readily material conducts heat,
eels. The property of the conduction of heat
ion to the closeness of the weave and the
ir which it contains. For this reason all
fabrics feel warmer than closely woven ones,
rinciple that the more layers of clothing there
layers of air will be retained between them.
methods of weaving cotton and linen fabrics
ave materially reduced their general defects
ing in cold weather, and if cotton or linen is
e skin it must be so woven as to give both
porosity to the fabric.

ajority of people, during the wet and cold
n undergarments are the best. If cotton is
be loosely woven, so that it may entangle a
y of air within its meshes.

lothing should fit tolerably closely the out-
figure, without impeding the movements.

possess the grave objection of winding about the legs in walking in the wind.

Lack of proper clothing of the lower part of the body is beyond question one of the chief causes of the great prevalence of pelvic inflammation and of Bright's disease in women.

But not only is there to be considered the danger of laying the seeds of disease from going out into the cold air while the body is too lightly clad, but also that, in order to maintain the normal temperature of the body in winter without the aid of warm clothing, requires a greater expenditure of nervous energy, which in turn is the equivalent of a large amount of life force. It is not only imprudent, but most injurious, to exhaust unnecessarily the powers, of the body, when mere mechanical appliances, like clothing, will obviate this continuous expenditure of vital energy.

Another way in which clothes save the wear and tear of the body is by diminishing the amount of heat the system must produce by the oxidation of the elements of food. When properly clad, there is less loss to the body of its heat, and consequently there is less food needed to supply this loss.

The Length of the Walking Skirt.—The present vogue of having the walking skirt five inches from the ground is an excellent one, as it not only considerably diminishes the weight of the skirt, but it interferes much less with the forward swing of the leg in walking, which otherwise has to be overcome by the muscular force of the leg. In walking, the length of the step should be proportionate to the length of the limb; the leg is carried forward by the unconscious swing at the hip.

The chief exertion in walking is caused by the raising of the foot and leg to the point at which it goes forward and downward. By any artificial shortening of the step, such as is caused, for instance, by long skirts, it requires much more muscular effort to walk the same distance. Besides which, there is the additional friction of the skirts,

reased by the slightest wind; this has been
e process of eternally walking through a field

ost important reason for not wearing long
e street is that they stir up the dust and col-
, and thus contribute materially to the dis-
the germs of disease and subject the wearer
ly to the risk of infection.
on of clothing takes an important place in
of the lungs. All clothing may be approved
ciently warm, and which allows of modifica-
ng to the variations in the temperature, and
ler the movements of the body, and particu-
hich are carried out by the respiratory muscles.
place, it is very important that the muscles
houlders should have perfect freedom of
rder that the expansion of the apices of the
not be interfered with. Clothes which hang
e shoulders, and especially those which grasp
tly, are unsuitable. Special attention must

CHAPTER VIII

PHYSICAL TRAINING THE KEY TO HEALTH AND BEAUTY

The Ancient Greeks the Most Perfect Type of Beauty; the Cause of the Inferior Physique of American Women; the Physical Training of the Japanese Women; Improved Physique as the Result of Physical Training; Increasing Stature and Improved Physique of American Men; Report of the Royal Commission of Great Britain on Physical Training; Physical Training Among the Ancients; the Influence of Physical Training on the Health and Life of the Individual; the Effect of Exercise on Brain Development and Character; the Physiology and Pathology of Exercise; the Relative Proportions of a Perfect Female Form; Table of Standard Weights for Women; the Muscular System; the Benefits of Exercise; Passive Exercise; Massage; the Balance and Carriage of the Body; Common Defects in the Carriage of the Body; the Heart's Need of Exercise; the Gymnasium in the Campaign against Disease; Gymnastic versus Athletic Training; Exercise after Eating; Effect of Brain Fatigue on Body Fatigue, and vice versa; Marks for Physical Efficiency; Advantages Derived from Athletic Sports; Ethical Value of Sports for Women; Forms of Athletic Games Best Suited to Women.

PHYSICAL training is the key to all beauty of form and face as well as grace of motion. Beauty without health is inconceivable.

The Greeks were the devotees of the beautiful, and they were the most perfect embodiments of health and beauty the world has ever seen. Their splendid physique was due to their outdoor life, physical training, which began in childhood and youth, and was systematically carried on throughout life, their public baths, and their athletics, sports and national games. Beauty is the inevitable corollary of health.

And the Greek artists bequeathed to all future generations a legacy of untold value, using the men and women of the golden age of Greece as the prototypes for the most

atues which the world has ever seen, proving gh the perfect development of the muscular e can an ideal type of beauty be attained, and s also show that the women of that day were l compeers of the men.

test attention to the physical development of was given in Sparta. Girls and young women ted to a similar, though less severe, training nd boys. It included running, leaping, wrest- hrowing the lance; these formed the favorite the national games. Xenophen says: "The e the healthiest of all the Greeks, and among und the finest men and the handsomest women The women of the Teutonic tribes frequently d their husbands to war, and exhibited in- e most daring bravery.

as well as these magnificent legacies in marble vas, teaches us that no greater fallacy could be an that "we are women, and therefore weak." rary. "We are weak, because it never entered

and that, taking the sum of the measurements of the head, chest, waist, legs, and arms, the mean total was equal in boys and girls. The sum of these measurements is regarded as indicative of the strength of the individual, but that, as a matter of fact, it was found that the girls did not compare favorably with the boys in point of strength. In capacity of lungs the girls were seventy cubic inches behind the boys, and that, in strength of the expiratory muscles, the weakest boy was stronger than the average girl. In strength of back, leg, chest, and arms, the showing of the girls was a little better, though considerably below what it should have been.

At twenty years of age the man was found to be five inches taller and twenty pounds heavier. The superiority of the male in strength was now much more apparent than at an earlier age. He now presented ninety cubic inches greater lung capacity and one hundred and forty-three pounds, greater strength of legs, while the muscular power of the arms and chest was more than double that of woman. The charts showed that women were physically inferior to men in almost every particular.

Dr. Sargent then goes on to say, "The principal characteristics of general form that distinguish civilized women from men are smaller muscles, sloping shoulders, broader hips, and shorter legs. The smaller muscles and the shorter legs may be said to be embryonic, while the superior breadth of the hips indicates a greater evolutionary advancement in this part of the body than has taken place in man. The constricted waist must be regarded as a deformity artificially produced. When the hips are large in the male or female, the waist will naturally be larger if the muscles which connect the trunk with the pelvis have nothing to constrict them. Since the hips of women are much wider than those of men, we should expect to find the waist proportionately larger in women than in men.

In close antithesis to these observations of Dr. Sargent's on the physical inferiority of American women to men, it is both interesting and instructive to note those of Dr.

his work on "Physical Training for Women Methods."

ical Training of the Japanese Women.—voman is usually the peer of a man of her own of the same age and height, especially when about equal. This is due to the fact that the men exercise in much the same way that the l devote fully as much time in the endeavor gth.

panese system of bodily training, known as s considered advisable in the initial stages to d girl contestants as nearly equal in age and ssible. The girls enter the arena upon equal he boys, and have proved their fitness to do so. and women practise together; other conditions the women show an equal amount of strength n.

of the average Anglo-Saxon woman is generkest part of her body, while the normal Jap-

and one of the pioneers in the systematic physical training for women, gave as the result of her experience there, "The gain of twelve months' exercise in the gymnasium is, for the chest two inches, stature two inches, and an increase of 30 per cent. in the lung capacity; many of the strength tests were doubled, the spine became erect and the arm vigorous, and the girl gained for herself the consciousness of controlling her own body instead of having it control her."

Increasing Stature and Improved Physique of American Men.—Dr. Born's measurements of Yale athletes and students suggest the inference that American men are becoming physically greater than any other known race. Comparing averages in 1903 and 1908, it appears that Yale men are one inch and a half taller than their predecessors of five years ago; they are twenty-seven pounds heavier, broader chested, and have an increased lung capacity of seventy-two cubic inches.

The measurements of Harvard students, published last fall by Dr. Sargent, corroborate Dr. Born's deductions, that American college men have larger and more vigorous bodies than their fathers.

Dr. Sargent's association of vigorous brains with strong bodies is borne out by Professor W. T. Porter's examination of 30,000 school-children in St. Louis in 1893, and by subsequent observations made by other men.

It is the opinion of Dr. Crampton, director of physical training in the New York city schools, that this improved physique in American men, observed in the universities, is not in a small measure due to the fact that within the last five years athletics have been introduced into the public schools, so that there are now hundreds of teams of baseball, football, basket-ball, and track athletics, where there was only one before, so that already the colleges are reporting that the young men entering them are bigger than they were ten years ago.

Professor Phillips of Amherst thinks that the young women are certainly one inch taller and five pounds heavier

ere ten years ago. This improved physique
; he attributes, like Dr. Crampton, to the fact
erican boy has now come in for his heritage of
'ts, and he makes a strong plea for "adult
every man and woman should have as good
ity as boys and girls to get out on an open
ay baseball, football, hockey, run, jump, and
time.

the importance which Great Britain places
training for boys and girls the following
Royal Commission of that country for 1903
r the caption "A National System of Physical

**Royal Commission of Great Britain on
raining.**—"(1) Physical training should be
of equal importance with mental training.
ng school life physical training is quite as
r girls as for boys.
ematic physical training is necessary both for

"Games are very useful and ought to be encouraged, but they cannot be played by all children, and usually the weaker ones go to the wall; that is, those most needing systematic development are excluded. Games affording opportunities for violent exercise are useful for the development of reserve strength, and form an admirable field for the cultivation of social and public spirit. We strongly favor their organization and development at all schools.

"For boys, in addition to the regular games, country runs, leaping and dancing the Highland Fling; for girls, skipping and hockey. For both, swimming is strongly advised."

Physical Training Among the Ancients.—Greek culture regarded the individual as valuable in and for himself, and sought to promote first of all his full and free development. The idea was symmetry and balance of parts, and, to attain complete and harmonious manhood, mind and body were trained together.

Games played an important part in the life of the Athenians, and their importance in the education of children was early recognized.

From the age of seven to sixteen it is probable that one-half of the day of the Athenian boy was spent in intellectual and the other half in physical education. The aim of the Athenian education was to produce men, independent but respectful, freedom loving but law abiding, healthy in mind and body, clear in thought, ready in action, and devoted to their families, their fatherland, and their gods.

Gymnastics included everything relating to the culture of the body.

The culmination of the Athenian education was dancing. As a supplement to gymnastic culture, it toned down the ardent exercise of the gymnasium and the over-energy of muscular development to the ease and grace which was the Athenian ideal.

The Romans.—The early Romans possessed some traits

vith the Spartans. They were intensely prac-
terested in those things whose usefulness was
Education should fit a man for his work in

structure, quite as characteristic as the Greek
was the public bath or therma, found not
e, but in every important provincial town
of the empire. Both made provision for
contained a system of baths, but in the
baths occupied the greater part of the space,
ms and courts for exercise were smaller and

ence of Physical Training on the Health he Individual.—If we believe, with Spencer,
ation is preparation for complete living,"
preciate that good carriage, bodily control,
gment, will power, and courage are an im-
of the equipment of every man and woman.
ies are intimately associated with motor
and they are best developed through

The Effect of Exercise on Brain Development and Character.—The growing interest in preventive medicine, and the very great popularity of the opportunities afforded for athletic training, attest to the value which people are beginning to place upon health as an asset in their social, domestic, business, and professional lives.

But it is not generally or sufficiently understood just how great is the effect of physical training on the development of the brain or upon the mental activities. With a strong, vigorous action of the heart there is a feeling of courage and general exaltation, whereas with a weak heart and enfeebled circulation, fear and impaired mental activity predominate.

The manner in which the organic functions are performed not only determine the health of the body, but the temperament and character as well. There is a conservation of energy in the fashioning of the will—only part of the energy is expended in the outward effort, while the rest goes to lay the foundation of a future will, so that exercise builds up faculty and conduct character.

We cannot perform an act voluntarily unless we know what we are going to do, and we cannot know exactly what we are going to do until we have learned to do it. The very simplest movement brings about a change in the organic structure of the brain, and this change leads to more complex movements and further improvement in brain structure. Most skilled movements give more exercise to the central nervous system than to the muscles. Movements calling for a high degree of skill, correlation of the different senses, sense discrimination, fine coördinations, and a rapid and responsible exercise of judgment, all tend, through the action of the association fibers, to a high degree of brain development.

An essential feature of exercise is that a part of it at least shall afford amusement, diversion, and recreation to the overwearied and harassed brain. Hence, the necessity to introduce dancing, field sports, etc. By these means industrial efficiency, communal morality,

nsciousness are promoted. Public amuse-roper sort are a public necessity.

menace to the city is the limited opportunities play, and over one-third of the population d States live in towns. The physical side of is the largest, for it involves health, and poise and self-control. It involves a legiti-tion of surplus energy and its wise direction, nvolves companionship.

object of physical training is then to secure erfect development of the body, with the g development of the brain, so that the sical and mental efficiency of the individual ned.

ssion of a large reserve of muscle and nerve to be used in any emergency, gives confidence dual, increases the spirit of taking the initia-ndertaking grave responsibilities that come of every woman, especially those who are the business or professional world, and the

exercises of effort, whether of strength, skill, or speed, demand and cultivate mental concentration, a rapid response of the muscle to the orders of the will, develop the power to accomplish complicated coördinations, and the knowledge of how these difficult movements may be performed with the least expenditure of nerve and muscle force. Exercising a muscle develops it up to its physiologic capacity, but if a muscle is habitually overworked, pathologic results occur, and instead of a quick, sharp contraction of the muscle, the contractions will be weak and uncertain, and, if carried too far, the muscle may eventually atrophy from overwork.

Exercises of endurance include walking, running, swimming, and rowing—the range of movement in these is much more limited than in exercises of effort. In these, each movement is well within the individual's powers, yet, by increasing the rapidity of the movements, or by their prolonged continuance, the total amount of muscular work accomplished may be very great. Normally, the contraction and relaxation of the muscles are comparatively slow, so that the poisonous waste matter producing fatigue is continually being removed from the tissues, and not allowed to accumulate; whereas, in exercises of effort, there is no time allowed for the scavengers to work, and fatigue of the most active muscles sets in rapidly.

Fatigue may appear in several forms, depending on the character of the exercise which produced it. When the exercise is sufficiently active, the amount of waste matter thrown into the circulation is greater than can be eliminated by the lungs; breathlessness and palpitation of the heart result; so soon as the equilibrium between waste production and elimination is established, the individual is said to have gotten his second wind. Or, again, a slow pace, too long kept up, will produce exhaustion, so that the products of tissue waste accumulate, the beat of the heart is fast, irregular and weak, the nervous system becomes stupefied, and the muscles fail to respond to the normal

stimulus. This is a form of fatigue not in-
found among zealous housewives, in which the
ade upon the nervous system by continual and
nily cares, added to the very strenuous work of
old, exhausts both nervous and muscular sys-

y from this form of fatigue takes a much longer
the preceding. The individual is too tired to
night is troubled by disturbed dreams, there is
and stiffness of the muscles and joints which
some days. There may be an actual rise in
re, and the urine passed has a high specific
ith sometimes even albumin.
this overwork is continued over prolonged per-
e, without allowing sufficient time for the neces-
eration, there follows a slow and profound ex-
which is much more difficult to overcome. In
tion the temperature becomes subnormal, the
reases, the skin and muscles become flabby, and
pale, the eyes are dull and listless, and the indi-

PLATE III

Senegalese woman. (*From Stratz, after Dr. Eykens, in Shufeldt's "Studies of the Human Form."*)

of cells lie inactive in various tissues of the body until they are brought into the circulation by muscular exercise.

Athletic training has been called "mainly heart training." Exercises of endurance do not require supreme efforts, but they do accelerate the action of the heart and lungs, and the aggregate of work done is very much greater than in exercises of strength, but the exercise must be sufficiently active to provide for the free circulation of lymph, which is carried on mainly through the massage of muscular contraction.

If a walk be so listless that there is not sufficient movement of the muscles to overcome the pernicious influence of gravity acting on the column of blood contained in the veins of the abdomen, thighs, and legs, the vessel-walls may become permanently overstretched and varicose. The exercise must be sufficiently active for the muscular contractions to empty the lymph-spaces and hasten the circulation. It usually raises the general bodily, as well as the local, temperature of the parts, and so facilitates the removal of the waste-products.

The acquirement of skill lies in the training of the nerve rather than the muscle. A simple movement requires only a nerve impulse to the acting muscle, while a complicated movement requires a wave of impulses to the accessory and antagonistic groups of muscles which control and steady the movement. It is easy to see how, in the first efforts to perform complicated movements, the contractions of the muscles will be jerky and inaccurate, many useless muscles will be employed, and the expenditure of nervous energy will be out of all proportion to the result, and these first attempts at new feats of skill rapidly exhaust the attention. This is well illustrated in the first efforts of a child learning to walk.

Exercises of strength and skill train that alertness of mind so essential in ordinary life. They shorten the period between thought and action, producing what is known as "presence of mind."

The Relative Proportions of a Perfect Female Form. — [illegible] of a perfect female form, [illegible] the Greek statue, [illegible] feet five inches, [illegible] thirty-eight pounds. [illegible] extended, [illegible] five feet five inches, [illegible] The length of the hand [illegible] seventh, and the [illegible] of the height. The [illegible] ground should [illegible] to the top of the [illegible] midway between the [illegible] from the elbow [illegible] as the distance from [illegible]. The measurement [illegible] should be the same as [illegible] should be the same distance [illegible]. A woman of this [illegible] around the waist, [illegible] under the arms, [illegible] them. The upper [illegible] the wrist six inches. [illegible] and one-half inches [illegible] and the ankle eight inches.

The table [illegible] Weisse, the Medical Statistician [illegible] Insurance Company, "A Table of [illegible]" is based on the average [illegible] women, and is given to show the [illegible] between the height and weight. A point [illegible] the table, and one that is not [illegible] variation in weight, independent of the height [illegible] ages.

PLATE IV

Juno.

The Relative Proportions of a Perfect Female Form.—The relative proportions of a perfect female form, as deduced by modern sculptors from the Greek statues, are as follows: With a height of five feet five inches, the weight should be one hundred and thirty-eight pounds. The woman should, with the arms extended, measure from tip to tip of the middle finger, five feet five inches; that is, exactly her own height. The length of the hand should be one-tenth, the foot one-seventh, and the diameter of the chest one-fifth that of the height. The distance from the perineum to the ground should measure the same as from the perineum to the top of the head. The knee should be exactly midway between the perineum and the heel. The distance from the elbow to the little finger should be the same as the distance from the elbow to the middle of the chest. The measurement from the top of the head to the chin should be the same as the length of the foot, and there should be the same distance between the chin and the armpits. A woman of this height should measure twenty-nine inches around the waist, thirty-four inches around the bust, if taken under the arms, and forty-three inches if measured over them. The upper arm should measure thirteen inches and the wrist six inches. The calf of the leg should measure fourteen and one-half inches, the thigh twenty-five inches, and the ankle eight inches.

The table on page 285, compiled by Dr. Weisse, the Medical Statistician of the New York Life Insurance Company, "A Table of Standard Weights for Women," is based on the average weights of over 58,000 insured women, and is given to show the normal relation between the height and weight. A point of extreme interest in the table, and one that is not generally recognized, is the variation in weight, independent of the height, at different ages.

PLATE IV

Juno.

PLATE V

Venus de Capua.

Ages.............. Heights	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	Combined Ages
4′–11″...........	111	113	115	117	119	122	125	128	128	126	118
5′– 0″...........	113	114	117	119	122	125	128	130	131	129	120
5′– 1″...........	115	116	118	121	124	128	131	133	134	132	122
5′– 2″...........	117	118	120	123	127	132	134	137	137	136	125
5′– 3″...........	120	122	124	127	131	135	138	141	141	140	128
5′– 4″...........	123	125	127	130	134	138	142	145	145	144	131
5′– 5″...........	125	128	131	135	139	143	147	149	149	148	135
5′– 6″...........	128	132	135	139	143	146	151	153	153	152	139
5′– 7″...........	132	135	139	143	147	150	154	157	156	155	143
5′– 8″...........	136	140	143	147	151	155	158	161	161	160	147
5′– 9″...........	140	144	147	151	155	159	163	166	166	165	151
5′–10″...........	144	147	151	155	159	163	167	170	170	169	155
Combined Heights........	123	126	129	132	136	139	142	145	144	142	133

Dr. Weisse found the average height of women to be five feet four inches, and the average weight one hundred and thirty-three pounds, and that the average male height was three inches greater than that of the female.

Women should range in weight from one and eight-tenths to two and two-thirds pounds to each inch in height. In order to determine your own factor in this respect divide your weight in pounds by your height in inches. Any weight above two and one-half pounds to the inch in stature may be considered as excessive, inasmuch as it adds nothing to one's mental or physical efficiency, and is frequently the forerunner of obesity, the remedy for which is to live on a selected diet and to burn up more through exercise.

In an ideal condition there is a sufficient quantity of fat to give a pleasing rotundity of outline. In women the tendency is for fat to accumulate, especially after forty years of age, about the waist, abdomen, and upper part of the thighs. In addition to the unsightliness which this gives to the figure, it is often the indication of the fatty degeneration of the muscles, and the heart is liable to become involved, and fatty degeneration of the heart is one of the frequent causes of death. The lack of use of the muscles in these regions of the body, which is caused by wearing corsets, is the reason for the accumulation of fat here. It can be reduced by the proper exercises and regulated diet.

The Muscular System.—The bony skeleton forms simply the framework of the body, and, while it determines the general outlines and height for the most part, the weight and general size of the body depend upon the muscular development and the amount of adipose tissue. The bones are not only padded about with muscles, but the muscles are inserted into the bony sheaths in such a way that a development of the muscles causes a development of the bones as well. Again, the stature is increased by the erect position of the spinal column, and this can only be attained by great strength of the muscles which

PLATE VI

Venus de Medici.

PLATE VII

Venus de Milo.

hold the spine erect. The inequalities of the muscles are filled out with adipose tissue, giving a pleasing contour to the face and figure.

There are some five hundred muscles in the human body; these muscles vary in size and form, according to

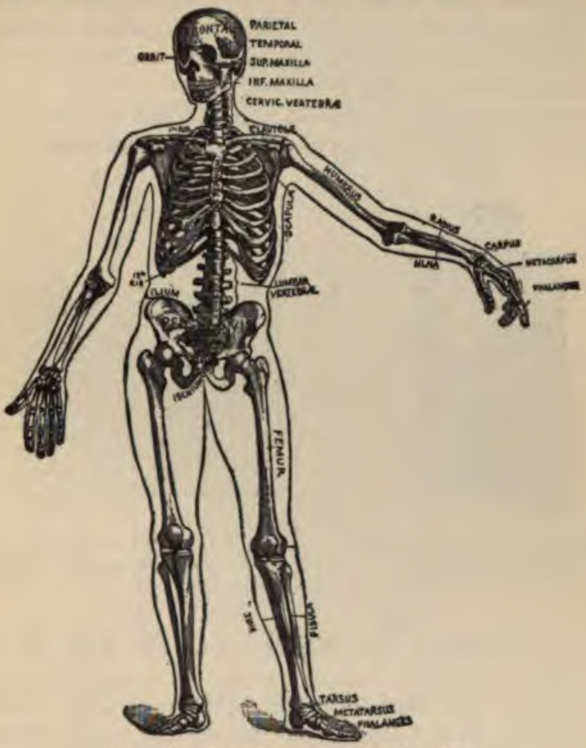
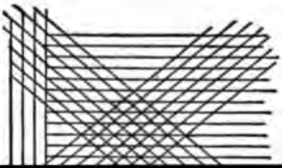


Fig. 21.—The skeleton (Lewis).

their situations in the body and the functions which they are called on to perform.

Nearly all the muscles in the body are arranged in two different or antagonistic sets, and are placed on the opposite sides of the part, so that in acting—that is, by

ractions or shortening—they move the limb directions, and it is by the alternate contrac- hortening and relaxation of the two sets of at the movements of the body are accomplished. es which bend the joints are called flexors, that extend the joints are called extensors, order to perform their work, which is that of , the muscles must exert enough force to he opposing muscles, overcome the tonicity gonizing muscles, and lift the weight of that the limb into which they are inserted. It is



that there are three layers of these muscles; and, lastly, that the fibers of the different layers run in different directions, so that they cross each other, as shown in the figure. The reënforcement of the layers, the arrangement of their fibers, and the manner in which they dove-

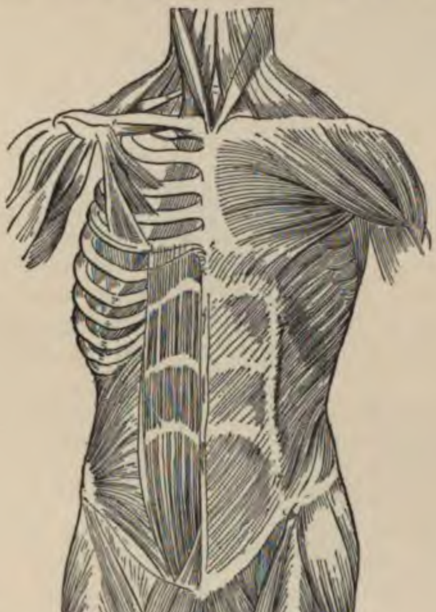


Fig. 24.—Muscles of the anterior surface of the trunk (left side, superficial; right side, deep).

tail into the adjacent groups of fibers give a structure of the greatest possible strength.

Action of the Muscles of the Back.—The trunk is kept from falling forward by the action of the muscles of the back. These are arranged in six layers. The cut shows the direction of the fibers. The first, or outside layer, consists of the trapezius and latissimus dorsi, or, in other

e broad muscle of the back. On the one side
cles are attached to the spines of the vertebræ;
ridge which is felt in the middle of the back,
road attachment to the pelvis afford a firm base
t. There are other muscles which run parallel

greater the displacement of the line of gravity, the greater the muscular effort required to maintain the equilibrium of the body.

Muscular Energy.—The muscles of the body, even when at rest, are under a slight degree of tension. When stimulated, the muscle contracts—that is, it becomes shorter and thicker. A muscle can only remain in a state of contraction for a few seconds, because the force of the muscular fibers is more or less exhausted during contraction. The more rapid the contractions, the sooner does fatigue manifest itself.

Like the steam engine, the muscles of the body, in performing their work, produce heat and motion. The fuel which supplies this force is taken into the body in the shape of food; it is prepared for use in the intestinal tract, and from there carried by the blood, to be stored up in the muscles and various tissues as latent force. The muscles contain one-fourth of all the blood in the body.

Heat Production.—By watching a muscle when contracting, we see that there is not only a change of shape, but a dilatation of its blood-vessels, that is, more blood passes through a muscle when it is contracting than when it is at rest, and this increased flow continues for some little time after the contraction has ceased; there is also a rise of temperature. Nearly three-fourths of the heat developed in the body is produced in the muscles at the actual moment of muscular contraction. Hence, we learn that the whole body is heated by muscular exercise; the even temperature of the various parts is maintained through the circulation of the blood. This combustion, going on throughout the entire economy, is the source of all force or energy in the body. In every movement, every breath taken, in the change even of a muscle of expression or the conception of a passing fancy, combustion has occurred and potential force has been

igue produced by muscular

n may be due to the consumption of the readily material present in the muscle, to the consumption e supply of oxygen, or to the presence of the of combustion, and, if Weichardt's theory is these must be added the presence of a definite oxin."

repose the internal changes of the tissue manuw explosive material out of the comparatively rial already present in the fiber, and the directly oducts of the act of combustion are either carried lergo changes by which they are converted into vely inert bodies. A stream of fresh blood its restorative influence, not only by quickening ese events, but also by carrying off the immediate ducts, while, at the same time, it brings new raw

movement of the body depends as much upon r coördination of the muscles for its accuracy, force as upon the strength of their contraction, the fatigue of which we are conscious in our own

venous blood toward the heart, if the proper direction, that of rubbing toward the heart, be followed; while, on the contrary, rubbing down a limb or from the heart actually retards the process which it is meant to facilitate. Gentle rubbing of any part of the body promotes growth, while vigorous rubbing removes superfluous fat.

Massage finds its widest field of usefulness in conditions of fatigue, where the elimination of waste matter must be assisted, and where the nutrition of a part is impaired or destroyed. Muscles can be improved in size, tone, and nutrition; ligaments can be stretched and lengthened, the general circulation accelerated, and overloaded veins made to disgorge their blood. The digestive tract can be stimulated, and overwrought nerves soothed and relieved of their hypersensibility.

The nourishment of the muscle-cell is improved by forcing out the products of fatigue and keeping it bathed in a constantly renewed stream of arterial blood. This alone is sufficient to prevent wasting of substance in conditions where active movements are impossible.

Massage relieves the nervous system by maintaining the nutrition of the muscles, without the expenditure of nerve force required to make them contract. It acts on the central nervous system through the nerves of sense, stimulating or soothing them, according to the nature and the amount of the manipulation.

Mosso and Maggiora, of Turin, have proved, by their experiments as to the effect of massage on the muscles, that muscles were capable of doing twice as much work after massage. It was also discovered that extending of the period of the massage did not produce any greater results in the capacity for work; the full effect was obtained in five minutes.

The action of massage in improving muscle tone, in postponing the onset of fatigue, and hastening recovery from it has long been recognized by athletic trainers. After a hard race or other contest, it is a matter of knowledge among trainers nt will

athlete to repeat or continue a performance
mpossible.
is the most economic form of exercise on the
stem. Its potency is shown by the increase of
od corpuscles and hemoglobin, and by the in-
e and force of the heart's beat without a corres-
ange in the arterial tension. It accomplishes
ts by decreasing the resistance in the peripheral
the removal of the products of oxidation, and
ically moving the blood-current forward in the
ces and venous channels. It is thus shown to
the circulation, the respiration, nutrition, and

describes four principal manipulations: *First,*
effleurage, in which the hand is passed lightly
in, with the pressure from the periphery to the
owing the course of the venous circulation, and
irection of the muscles from their insertion to
n. It may be performed by stroking with the

and small groups. The movements should proceed from the periphery toward the center. It is used to improve muscular nutrition in case of fatigue, in atrophy, in obesity, and other forms of muscular degeneration.

Fourth, Striking, Tapôtement, or Percussion.—Other names are clapping, beating, knocking, or hacking. It has a stimulating action on the skin, superficial nerves, and vessels. Hacking is performed by the ulnar border of the hand, and is used along the nerve-trunks.

Fifth, Shaking or Vibration.—Shaking involves movements of the whole body or region to be treated, while vibration is a lesser motion in which the body or region remains at rest, while the surface and the structures immediately beneath it are affected.

General massage is best given at an hour midway between meals, and never immediately after eating. The parts are at first lubricated with cocoa-butter or vaselin, to avoid the irritation which may follow the friction of the surface.

The first process of massage is the simple stroking to empty out the lymph-channels; the next process is directed to the deeper tissues. This is deep kneading, and skill is particularly required here. As the result of this, the muscles are toned up and the nerves are soothed, so that the total effect is that of sedation, and is followed by the removal of the fatigue toxins, so that if necessary it will be possible to undertake work after the massage that would have been impossible before.

The operator starts with the feet. After both surfaces of the foot have been well covered, the foot is firmly grasped and all the natural movements of the toes and ankles are gone through with. Next the region of the ankle, the leg, which is treated by circular friction by the fingers, by deep grasping of the areolar tissues, and, last, by deep pinching of the larger muscle masses. At brief intervals upward stroking is given from the ankle to the knee, to favor the venous flow of blood-currents. The same process is gone through with in the case of the hands and arms. Especial care is next given to the muscles of the

The abdomen is then treated. Massage of
n concludes with deep kneading by the heel of
n the direction of the colon. The chest is manip-
ward, from the sternum along the line of the
muscles. The face is not usually treated in
assage, but the sides of the neck are stroked from
wnward, along the course of the internal jugular
ach part operated upon should be carefully
s soon as finished.
a constant rise of temperature after the treat-
l there should be a rapid improvement in the
reaction of the whole muscular system.
al fault in giving massage is that too much is
ne time; the maximum effect on a part is ob-
ive minutes. Another mistake is to employ too
and. A patient should never feel bruised or ex-
fter the treatment; there should be simply a
assitude and feeling of drowsiness.
massage is not essential for the health, it aids
in maintaining good health, but, in order to be

a normal development of the lungs and vigor of the heart.

It is upon the erectness, suppleness, and strength of the spinal column that most of the power and grace of the body depend. In the proper carriage the natural lines of the spinal column form a graceful and undulating line, and the body stands erect without any particular effort.

The curves of the spinal column are of great value in protecting the brain, as they weaken the force of any shock, which may be caused by striking the bones of the feet.

Common Defects in the Carriage of the Body.—Owing to the common faulty position of school children at their desks, the sedentary occupations of women, and their lack of physical training curvature of the spine is very common. A stooping carriage is the most common. The head is bent forward, the chest is sunken, the back is round, the shoulder-blades hang outward, the inner edges standing out like wings, and the abdomen is protuberant. The muscles are poorly developed and are weak and flabby.

This stooping carriage interferes with the freedom in breathing, and prevents the proper development of the upper part of the chest and lungs. Hence, it predisposes to lung diseases and tuberculosis, a weak heart, poor circulation, shortness of breath, inability to take proper exercise, and thinness of the blood (anemia).

Spinal Curvatures.—The spinal column is normally directly in the middle of the back; any deviation of this column to either side is abnormal, and the lungs become cramped in a small and non-distensible bony cage. This spinal curvature is most apt to take place in young girls or in adult women after a severe illness, when the muscles of the back have become particularly flabby, and, while still in this condition, improper attitudes are assumed at the desk or other sedentary occupations.

Preventive measures are of the utmost importance. First of all, comes the general strengthening of the body,

e muscles and bones in particular, by plenty of n the open air.

bitual attitude at the desk and work should al- carefully observed, and in all sedentary occupa- work should be frequently interrupted to take c breathing exercises before an open window.

spinal curvature has actually taken place, es- ercises must be taken under the supervision of a and instructor. Gymnastic exercises must be nted by outdoor games and sports.

eart's Need of Exercise.—The first essential for tenance of health, capacity for work, and power nce of disease is a normally developed and strong 'irst, there must be secured a vigorous circulation od, and the two greatest helps to this are exercise breathing. In the sedentary posture the heart a disadvantage.

e young, exercise of the heart is the chief object al exercises; this object is best attained by ex-

walls of the arteries begin to lose their elasticity, they become more rigid, and chalk salts are deposited in them. Golf and lawn-tennis are now excellent.

And now it is most essential that exercise be kept up; the heart must still be trained and practised. The fibers of every muscle degenerates when their work is reduced to a minimum.

Proper health without proper breathing is a physical impossibility. It is necessary that those portions of the lungs which do take part in ordinary breathing, and which would atrophy from lack of use, should be fully developed and kept ready for suitable exercise. As soon as the lungs grow weary and the power of breathing is exhausted, the most powerful muscles of the body give way. The pleasure of vigorous walking, especially in mountainous places, is alone for her who can respond easily and readily to the enormously increased demands on the power of the respiration.

The direct result of exercise is an increased demand for oxygen by the tissues, and, to meet this demand, respiration is deepened and quickened, and the beat of the heart is more rapid and more forcible. But the phenomena of increased breathing power and increased heart action benefit other parts of the body. At the commencement of an exercise the contraction of the voluntary muscles called into action compresses the blood-vessels, and impels the venous blood actively toward the heart, which, thus stimulated, contracts vigorously, and propels the blood in increased quantity toward the lungs. Stimulated by the pressure of a large amount of venous blood, the inspiratory muscles contract and elevate the bony structure of the chest, the diaphragm pushes down the abdominal contents, and the air rushes in to fill the vacuum thus produced and to supply the oxygen necessary for the purification of the blood. Supplied with this life-giving element, the blood is returned to the heart, to be distributed again throughout the syst[illegible]
incurred in the original

manner are not only the voluntary muscles en-
l strengthened, but also the involuntary muscles,
ly the heart and the diaphragm. The increased
f the circulation stimulates other organs to in-
tivity. The quantity of perspiration from the
re than doubled, the appetite is increased, diges-
re perfect, absorption is more rapid, the hepatic
n is more active, and the abdominal circulation is
more vigorously.

the other hand, actual harm may be done if
ho has been accustomed to lead a sedentary life,
not vigorous, suddenly engages in the more
rms of exercise. In this extreme exertion the
y be embarrassed by the respiratory action.
l of deep inspiration the increased pressure of the
edes the flow of blood from the right side of the
ile the compression of the heart itself by the
lungs tends to overfill the large veins, and to
danger the right side of the heart.

general muscular contraction the arterial pres-

classes to lead an outdoor life, but the women of the middle and lower classes do not obtain enough variety of exercise or enough fresh air, and to the lack of proper outdoor exercise is due their anemic condition, pallor, flabby muscles, and generally ill-nourished appearance.

With the division of labor and the increase of wealth it has become possible for a large proportion of the community to live without much all-round mental or physical activity. As a consequence, there are faulty circulation and defective nutrition, the vital resistance of the body is lowered, and some of its various organs or tissues are ever ready to take on disease. The lowering of the tone of the body through dissipation, want of fresh air and sunshine, insufficient sleep, lack of proper occupation or recreation, also increases the susceptibility of the body to disease.

Senile decay is by no means only a matter of years, but the manner of life led. And very many people over forty years of age fall into a condition of senile decay, merely because they do not take a sufficient amount of active exercise. In consequence the joints stiffen, the muscles relax, and the arteries harden prematurely. The prime of life would be very greatly extended, and old age delayed, if women only continued their active interest in work and systematically kept up gymnastic exercises and outdoor sports.

For all classes of women provision must be made, and sufficient time afforded, to be devoted to some form of mental and physical recuperation and systematic physical training.

Gymnastic versus Athletic Training.—The actual experience of the past few decades has proved that the most effective way of developing the mental and physical powers and the constitutional vigor is through a judicious system of gymnastics, athletics, and carefully supervised plays, sports, and games.

To show which of the two contestants was the "better man" was the primary objec[illegible]
the fundamental source of

s relied for her physical training upon a large ames and sports, instead of an elaborate system cs. The Englishwomen live an outdoor life, lkers, horseback riders, and go in for athletics and we find that the English women have a vigorous physique and healthy and ruddy ap- an their American sisters.

y, Sweden, Denmark, Finland, France, Ger- Italy more stress is laid on the gymnastic d in the Olympic contests, held in London in venty-five women from Denmark afforded a many of the Americans present.

ymnastics had their origin in Swèden, and are rgely in that country and on the Continent.

stic exercises the work done on each piece of ust be tried repeatedly, in order to be learned, ust be practised assiduously, in order to be ed. This is what makes gymnastics so valu- eans of physical training and development.

the possessor as well as to the onlookers. The esthetic advantages of health are very considerable.

Among the mental and moral advantages to be derived from the practice of exercises and games are a greater amount of self-control, persistence, regularity, promptness, and of general self-confidence. In the playing of games there is opportunity for originality as well as for observation. The unwritten code of honor, the need of accuracy—all these qualities are essential for a successful and happy issue in the great battle of life.

The ideal physical training requires that systematic gymnastic exercises should be supplemented by outdoor games and sports. Gymnastics are not sufficient for an all-round means of development, because the movements are too regular, too expected, and too deliberate, but they are invaluable for health and physical development, for the correction of physical deformities, as a foundation for many games and sports, and for supplementing the same. Many games are so one-sided that gymnastic exercises are essential to prevent the body from becoming unsymmetrically developed, and, further, gymnastic exercises must invariably be the foundation for all games; no games can do what they are really capable of doing without the firm foundation of the best gymnastic training.

Those exercises and games should be selected which are the most fundamental and the most healthy, which will cause the all-round development of the body, the muscles, heart, lungs, chest, a good condition of the blood, good circulation, breathing, digestion, and the getting rid of the waste-products.

Such exercises should teach obedience to law, self-control, regularity, promptitude, and readiness to meet fresh conditions or emergencies, persistence, pluck, and the ready coöperation of nerves and muscles.

The aim of gymnastic exercises should be to secure a symmetric development of all the muscles the body, to correct one-sidedness, spinal curvatures, and other

fects, and to strengthen all the muscles of the the gymnasium especial attention must always o the development and strengthening of the the back and chest, as these are the ones that be the most poorly developed in women, since ss called into play in walking, which is the only at most women take, and on their good develop- strength depend the upright carriage of the od chest capacity, and, hence, good respiratory vigorous heart, and good circulation.

after Eating.—Severe mental and vigorous rcise immediately after a meal retards gastric The entrance of food into the stomach excites w of gastric juice, which, like all the secreting s dependent upon a flux of blood to the secret- Other parts of the body, notably the brain, temporary anemia, and hence the great ten- rowsiness after eating a hearty meal. At such re mental work or vigorous bodily exercise must

Vice Versa.—Brain fatigue makes the sense of touch less delicate. Similarly, muscle fatigue affects brain power; severe muscular exertion may bring a disinclination and incapacity for brain work. Hard exercise uses up nerve force, and also causes the circulation of waste-products in the blood, and so the action of the brain is hindered. On the other hand, many people who do a great deal of brain work know that an early morning walk, a pull on the river, is most refreshing and stimulating, and actually makes them more capable of doing good brain work; that is, if they are in fair training and do not take enough exercise to make them tired.

It is beyond question that a dull gymnastic drill, coming after hours of hard school work, may be a very heavy tax on the brain and nerves, and can hardly be a relaxation. Outdoor exercises, which require practically no brain work and a good deal of muscular exercise, would do good, such as walking, running, jumping, and various kinds of games; while, on the contrary, exercises of skill would be a serious tax.

The suggestion has been widely accepted, that brain work should occupy the morning hours, while technical education, such as singing, drawing, and physical training, should be given in the afternoon.

Marks for Physical Efficiency.—The tests suggested some fifteen years ago by Sir Francis Galton, the eminent English scientist, for assigning marks for physical qualifications were the following: First, breathing capacity; second, strength tests, both of them to be regarded with reference to the stature and the weight; third, quickness of response to a signal, made either to the eye or ear; fourth, keenness of eye-sight; fifth, keenness of hearing; sixth, color sense.

Dr. Sargent, realizing the usefulness of these tests in measuring physical efficiency, included them in the physical examinations of the Harvard students. [illegible]
tests consist in the strength of each for [illegible]
the legs, the dip, the pull up, and the [illegible]

ion of these seven tests is known as the inter- strength test, and is the best means as yet de- neasuring the general muscular strength and the y power.

dvantages Derived from Athletic Sports.— an take the place of athletic sports to develop gorous bodies in girls and young women. While mnastics have both an educational and correct- and lay the foundation for athletic sports, they ke the place of outdoor sports to develop organic ysical and moral courage, self-reliance, judg- -control, decision, and ethical training, a consid- r the rights of others, and a relaxation, particu- mental work. Athletics are to youth what play lren. Groos tells us that a function of play is to outlet for exuberance and animal spirits in the

thical Value of Sports for Women.—First benefits to the individual and second the bene-

run along different lines from men's. The object of women's games are for their development and individual good, and should, therefore, never be played before indiscriminate audiences who pay an admission fee.

Women have the same necessity as children and men for a wholesome physical outlet for the exuberance of animal spirits and energy.

The esthetic value of games has been found to be expressed in the improvement of the personal habits and appearance, which indicates a higher standard of living.

And the psychologic value has been found to be a development of the mental and the moral qualities, and so the individual is the better enabled to direct her efforts wisely and so more successfully in life's activities.

All of this is not a matter of theory, but it is the universal testimony of the directors of the various athletic associations for women all over the country.

Among other developments along the physical line are endurance, skill, precision, and coördination. To be able to do physical things well has an ethical value in the individual's attitude toward life in all its phases.

The esthetic value lays stress upon the beauty and good form of games. It is essential in playing games that women should stand well, walk well, run well, throw well, and have a neat appearance. The manners and habits of the players on the field are also part of the esthetic training.

It has also been noted that for reasons largely beyond her control the primitive occupations of women have been taken out of her hands, and have forced her, in order to secure a maintenance for herself, or those depending on her for support, out of the home into the industries and occupations of the world, together with a fierce competition which this necessitates. In other words, success is based upon competition, and competition is the keynote of organized games. So that one of the values of games is to maintain fair, economic, and coöperative rules of competition. Other things being equal, the athletic man or

o has played according to the rules of the games
be fairer than he who knows nothing of clean

the mental qualities developed are observation,
concentration, memory, imagination, initiative,
d will power. These qualities are most highly
in the various ball games, from its simplest
am work, as baseball and basket-ball.

al qualities developed are self-control, unselfish-
se of honor, self-sacrifice, self-confidence, fair-
ocracy of spirit, modesty, and decision. One
lities which characterizes a good player is that
the things which are assigned her. Prompt-
bedience to order are the first laws in any game.
t the game self-confidence is taught. Each
her own responsibilities, decisions must be
d accurately made, while overconfidence brings
at.

tition underlies all games, it is equally true that

of feeling; the thought must be riveted on the thing to be done. Every girl's school and woman's club which provides opportunities for games and sports erect barriers against nervousness, morbidity, and too much introspection. These qualities which games develop are not masculine, but human; qualities needed for human fellowship.

The Forms of Athletic Games Best Suited to Women.—Dr. Sargent's conclusions as to the form of athletic games best suited to women, coming from a man of his wide observation and great experience, should be more generally known, and he says, without hesitation, that there is no athletic sport practised in which some women cannot enter, not only without fear of injury, but with great prospect of success. But the feminine type of build, whether found in men or women, is a handicap in many athletic contests. But these limitations do not apply to girls between ten and fourteen years of age. During this period girls, if properly trained, will often surpass boys of the same age in any kind of athletic performance. Moreover, if girls were given the same kind of physical training as boys receive all through their growing and developing period, they would be able to make a much more creditable showing as athletes when they became adult women. In the early history of mankind the men and women lead lives more nearly alike, and were consequently more alike physically and mentally than they have become subsequently in the history of highly civilized people.

From a physiologic standpoint, woman needs exercise just as much as man does, but, in taking up athletics, these must be regulated on a different basis. Women, as a class, cannot stand prolonged physical or mental strain as well as men do, but give them frequent intervals of rest and relaxation, and they will often accomplish as much in the twenty-four hours as men do.

From her physical configuration and her inability to bear prolonged physical and mental strain, there are certain athletic sports and games that would be likely

jurious to most women if played in the form in
are played by men. In this group are foot-
ockey, polo, basket-ball, boxing, fencing, pole
and heavy gymnastics. If these sports and
uld be so modified as to meet the peculiar char-
of women, there are none of them that could
yed with reasonable hopes of physical, mental,
improvement.

letic exercises and games to which women are
ed, and in which they are most likely to excel,
ns of dancing, calisthenics and light gymnastics,
awn-tennis, swimming, field hockey, lacrosse,
ning, bicycling, rowing, canoeing, golf, skating,
sket-ball, and all gymnastic plays and games.

hletic exercises in which women engage, good
er than great records, should be striven for.
ay be excused for not being as strong and en-
men, but they cannot be excused for not being
ed and graceful. Good carriage, perfect poise,

CHAPTER IX

SYMMETRIC DEVELOPMENT: GOOD CARRIAGE AND GRACE OF MOTION THROUGH GYMNASTICS AND ATHLETICS

Gymnasiums, Baths, and Athletic Association: a Fundamental Part of a Woman's College and a Model Woman's Club; the Vassar College Gymnasium; the New York Colony Club; the Young Women's Christian Association; Self-made Good Physique through Physical Training; Rules for Taking Exercise; Gymnastic Dress; the Configuration of the Foot; Correct Attitude in Standing.

Corrective Exercises: Exercises for Developing the Various Regions of the Body; Shoulder-blade Exercises; Respiratory Exercises; Exercise for Forward Projection of Chest and Retraction of Abdomen; Shoulder and Back Exercises; Leg Exercises; Squatting Exercises for Muscles of Spine and Abdomen; Alternate Kneeling; Abdominal Exercises; Balancing Exercises for Poise and Carriage; Balancing Exercises for Extending Depth of Chest; Lateral Trunk and Waist Exercises; Exercises for Muscles of Back; Exercises for Muscles of Abdomen; Swimming Exercises, for Back, Thighs, and Abdomen; Rope Pulling-exercises for Back, Chest, Waist, Legs, and Arms; Exercises in Trunk Flexions for Back, Abdomen, and Legs; Exercises with Chest Weights for Chest, Shoulders, and Arms; Boxing and Fencing; Classic and Esthetic Dancing an Essential Feature in Physical Training.

Outdoor Exercises: Effect of Walking on the Heart and Lungs; Running; Mountain Climbing; Swimming; Horseback Riding as an Exercise; Rowing.

Athletic Sports: Croquet; Lawn-tennis; Golf; Hockey; Basketball.

Gymnasiums, Baths, and Athletic Associations a Fundamental Part of a Woman's College and a Model Woman's Club.—It has been repeatedly and conclusively proved, in a large series of cases, that the physique, carriage, and health of woman can be wonderfully improved by regular and systematic gymnastic exercises, combined with outdoor exercise and athletic sports.

tated, the facts in the matter are these: the bony
iscular systems and the vital organs are the same
en and women, and hence the general scheme of
raining, which has been found to be so highly
to men, would, if properly modified, be equally
to women, and such a training for women is
he most competent authorities of the day.
rds of the body weight consists of bones and
nd the development, growth, nutrition, and vigor
scular and bony system can only be maintained
ercises as will call into play the action of all of
es of the body, that is, the stature, breadth of
and size of the chest, as well as firm, hard
re dependent on regular and systematic exer-
ery part of the body, and through the beneficial
duced through exercise on the respiration, cir-
and digestion, etc., the brain, nerves, heart,
hort, all the organs and tissues of the body, are
healthy condition.
of the masses of women to-day is being spent

their own factories would both improve the health of their employees and be to the financial interest of the firm, are now providing well-equipped gymnasiums, under the direction of competent instructors, furnished with baths, resting-rooms, restaurants, etc., for their employees, and these experiments have demonstrated that the improved quantity and quality of the work, the lessened amount of sickness among the employees, more than compensate the employers for the expenditure of money and the time consumed in physical recreation.

It is only within the past decade that the great benefits to be derived from a systematic, gymnastic training, combined with athletic sports for girls and women, has been generally recognized. To-day all our best colleges for girls and young women have well-equipped gymnasiums, with a corps of competent instructors, where a scientific and systematic course in physical training is given during the winter months, supplemented during the fall and spring months by outdoor athletics and games. And, further, this course is obligatory during the freshman, sophomore, and junior years.

The result of the gymnastic and athletic work done at Vassar College for the past fifteen years shows a very great improvement in the physical development, the lung capacity, and the general health of the students. The average lung capacity for women is given as one hundred and fifty cubic inches; at Vassar the average lung capacity is one hundred and sixty-five cubic inches.

The Vassar College Gymnasium.—As Vassar College has a model gymnasium, an unusually fine corps of instructors, and gives the greatest attention to all the details of the physical training of its students, it may very properly serve as a model for schools and women's clubs throughout the country.

The instructors all received their training at the Sargent Normal School, Cambridge, under the direction of Dr. Dudley A. Sargent. Hence, it is naturally run along the same lines.

asium work is carried on from the middle of er until the end of March. The gymnasium is d with the usual apparatus for light and heavy The entire student body is divided into four each class meets three times a week, and the period in the gymnasium lasts forty-five minutes. This ed by the shower and needle baths.

vands and dumb-bells used are wooden ones, and weight from three-fourths of a pound to two and a nds. Other apparatus that might be used in the ymnasium are the chest-weights and the rowing with a movable seat.

iction in classic dancing is part of the regular gym-ork.

Vassar gymnasium is also furnished with a fine ng pool. The temperature of the water is kept 75° to 80° F. For beginners it is necessary to nuch higher temperature than for expert swimmers. will be greatly encouraged to learn to swim from

PLATE VIII

Vassar College gymnasium.

VASSAR COLLEGE GYMNASIUM.—RECORD OF PHYSICAL MEASUREMENTS

MISS . . . .

EXAMINATIONS

	First.	Second.	Third.	Fourth.	Fifth.	
Height						Centimeters.
Weight						Pounds.
Lung capacity						Cubic inches.
Girth, chest						Centimeters.
Girth, chest, full . . .						"
Girth, chest, ninth rib.						"
Girth, chest, ninth rib, full						"
Strength, back						Kilos.
Strength, legs						"
Strength, chest						"
Strength, right forearm						"
Strength, left forearm.						"

The instruments needed for making these tests are the spirometer and two dynamometers, one to test the strength of the muscles of the back and legs and the other to test the muscles of the arms.

Outdoor sports and athletics are begun in the fall, on the opening of the college, and are continued as long as the weather permits. The students then take up the regular gymnastic work until the spring of the year, when athletics are again resumed. Here again three hours a week are obligatory. It should be stated here that during the menstrual period the girls are not only excused from gymnastics and athletics, but absolutely forbidden to take part in these exercises.

The list of games include croquet, lawn-tennis, hockey, and basket-ball. Rowing has always been a favorite

ort at Vassar. In 1909 horseback riding was
ı up; riding lessons were begun in April, and
ed girls took lessons. With the exception of
ty, they all rode astride. An ordinary man's
be used, but a somewhat narrower saddle, with
ont, is more comfortable.

York Colony Club.—This has a model club-
its gymnasium, baths, swimming pool, lecture,
g rooms, as well as bedrooms, for the out-of-
bers who may be guests. It is, therefore, a
ter for the physical and mental development of
s. To this should be added an athletic associa-

ht well, then, serve as a model for the women's
he country. In the large cities the numbers of
d be commensurate with the population. In
and villages the entire citizenship should club
s a great civic movement affecting the health
of the entire town, and in the resulting good
l benefit reflexly through their wives and

While membership in a well-appointed gymnasium and athletic association offers the most favorable conditions for the symmetric and fullest development of the body, and when possible it is advised always to take at least a short course in physical training under the direction of a competent instructor, yet every woman has it in her power to very greatly improve her physical condition without these aids.

Systematic physical training should be begun in childhood and continued all through life.

Before twelve years of age physical training should be the same for both sexes, and girls and boys should have their sports and games together. The beneficial influence of this will be manifest for both—girls will grow stronger, less timid, and more resourceful, and boys will grow more refined and thoughtful.

But even the case of the adult woman, where not only physical training but most of the laws of health have been neglected, is far from hopeless. A poorly developed chest, round shoulders, a beginning spinal curvature, a poor carriage, bad skin, poor circulation, indigestion, constipation, and low vitality, with poor powers of resistance to changes in the weather and environment, are not insurmountable obstacles. But a woman in this condition cannot manage her own case. She must consult and place herself under the care of a competent physician.

Physical Examination.—Before any kind of exercise is undertaken, a careful examination should be made by a competent physician. This will include an examination of the heart, lungs, blood, urine analysis, to ascertain the condition of the kidneys, an investigation of the digestive apparatus, and the character of the stools.

Only in this way can the best results be obtained, and all danger of harm averted by the avoidance of those exercises which, by being too violent, would be actually harmful, and that, where needed, corrective exercises may be prescribed, together with the length of time that any one exercise should be continued.

here are marked symptoms of serious pelvic
local examination should be made by a gyne-
d, in case of tendency to spinal curvature, the
n orthopedic surgeon should be sought at once,
e very valuable time may be lost, and a slight
that could have been cured in the first place, is
grow into a deformity for life.

rts should be made out; the first should be a
tline of her present condition; to the Vassar
dy given should be added the physical defects
rection, as round shoulders, poor chest develop-
itation of the heart on exertion, length of walk
taken comfortably, also the time required per
he strength of the heart and lungs increases, as
nly by the actual tests, but also by the increased
endurance, this first chart will be a matter of
ragement to the woman and a great incentive
ffort. In a parallel column to the defects should
the corrective measure for those defects.

should walk until she feels the first signs of fatigue, rest, and then continue her walk. If the weather is too cold for sitting out-of-doors the woman should preferably take two short walks each day, one in the morning and the other in the afternoon. For invalids about ten in the morning and two in the afternoon are the best hours in winter, because of the greater warmth of the sun at those times. To be effective, exercise out-of-doors must be taken every day without regard to the weather, since the system, when in a state of activity, is less susceptible to sudden changes of temperature than when at rest.

Exercise should not be taken after long fasting; hence, never before breakfast, nor immediately after a hearty meal. An hour after breakfast or a light lunch, or two hours after dinner, is the best time for regular exercise.

A certain amount of daily exercise is essential for the preservation of the health. A healthy woman should be able to walk five miles a day, at the rate of three miles an hour, without feeling any sense of fatigue.

In order to secure the greatest amount of benefit from exercise, the mind should be entirely free from care during the exercise, so that the woman should leave her cares at home and give up her mind and body to recreation while she is out-of-doors.

Regularity in taking exercise is absolutely essential to secure good physical development and to maintain the body in a condition of health. A fixed hour should be set aside for this purpose every day.

No definite rules can be given for the exact amount of exercise to be taken at one time, but the occurrence of fatigue is the signal for rest; after a five minutes' rest, exercise may be again resumed, to be stopped again at the same signal of fatigue. Perhaps three periods of exercise, alternating with rest, may be taken, but, in order to do good and not harm, the individual must always stop before she is tired.

A period of free exercises should begin with a twenty minutes' practice, including movements for arms, legs,

iest, and abdomen, with especial emphasis on the poise and carriage of the body and deep breathing, hould terminate with running; or, if in a class, with ıg game.

hose of mature age and sedentary habits especial st be taken not to overtax the heart, always be- with the simplest movements and stopping at the ns of fatigue.

e gymnasium the periods of exercise generally orty-five minutes, with frequent intervals of rest een. Even here an invariable rule should be never ise to extreme weariness.

xercise should be followed by a shower or needle nd a vigorous rubbing with or without alcohol. licate women who have been unaccustomed to tak- rcise should rest on the couch or bed for one hour proceeding to dress. It is well to sleep, if possible, his way they will find the good effects of the exer- y greatly increased.

rooms must be thoroughly ventilated before the assemblage of the people. The air must be kept cool, between 50° and 60° F., and proper arrangements must be made to keep the room well ventilated while in use without causing direct drafts.

Well-waxed, hard-wood floors are the best, because they can be kept freest from dust. Students should never be allowed to enter the gymnasium with their street shoes on, as they carry with them much dust that will be thrown in motion and inhaled during the performance of the vari-

Fig. 26.—Upper surface, bones of foot (Allen).

ous exercises, and there follows not only the irritation caused by the inhalation of the particles of dust, but also the danger of inspiring all kinds of germs of disease with which the air is laden.

The Configuration of the Foot.—No study of the correct attitude of the body at rest or in motion would be complete without some knowledge of the structural arrangement of the foot. The feet form the base of support for the entire body, and at every step are subjected to a pressure of from one hundred to two hundred

ase is in the form of two arches, a transverse and oposterior. The latter is the most important, and subdivided into two by an imaginary line, drawn the third and fourth metatarsal bones. The inner of this arch is much more curved than the outer, ms the instep. The arch is supported by two The posterior pier is formed by the os calcis, or e, and the posterior part of the astragulus. It r, has but one joint, is more curved, and is, at the e, more solid than the anterior pier, and receives ter part of the weight of the body. The anterior udes all the bones in front of the astragulus to tion of the three metatarsal bones with the toes. ch the longer, is less curved, and has many joints, greater elasticity, and also enabling it to diminish of shocks transmitted to the arch. The summit ch is the ankle.

evident that the superincumbent pressure, by g the arches, both lengthens and broadens the he anteroposterior arch is further lengthened by

27, 2), and the weight of the body is shifted more and more to the center of the foot and toes, the latter spreading and pushing the body forward. This last is the movement which displays to the greatest advantage the suppleness and elasticity of the articulations of the foot, and the adaptation of the arch to receive the weight of the body, and to transfer it to the distal pier, while the body is being moved forward by the same act. It is the exe-

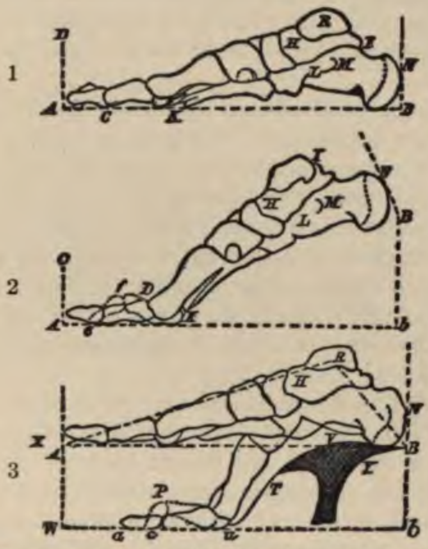


Fig. 27.—The natural and artificial positions of the foot (Camper).

cution of this movement which gives to the gait of woman that elegance and those graceful undulations which are so attractive.

"The narrow high-heeled shoe, on the other hand, by displacing the supporting base, causes both piers of the double-spanned arch to strike at the ground simultaneously. In consequence of which the gait, instead of being undulating, is stiff and hobbling, and the body advances by jerks.

n standing on the heel bone (*NLM*, Fig. 27, 1), t at *K*, and the great toe *C*, touch the support e line *A–B*. When the feet are shod according to sent fashion, the line *A–B* is made to assume cave form shown in Fig. 27, 3, by *BTu*. The s made more convex and rounded, and the actually shortened (see *a–b*, Fig. 27, 3). The elevation of the heel places the body of the an in the same position as when standing upon an plane. Again, the heel is so shaped and located orces up the keystone of the arch and weakens the ructure."

Correct Attitude in Standing (See Fig. 28).—ls are placed nearly together, the toes pointed ghtly outward, the legs are rigid, the trunk and e held erect, and the shoulders somewhat back, the chest shall expand freely. The arms should ily at the sides; the fingers are slightly bent, with nbs in front. This position of "attention" can maintained comfortably for a very short length

with the inner borders of the feet nearly parallel to each other and the direction of motion. The best sculpture, both ancient and modern, shows the straight supporting foot, which in standing is not necessarily parallel with its mate, since the resting foot may assume almost any angle of divergence.

The influence of the stability of a correct base is well illustrated by standing on one foot and swinging the other leg backward and forward, which is much more difficult if the supporting foot be turned to one side. A runner finds it very difficult to run with the toes turned out, although the heels never touch the ground.

Corrective Exercises.—Many of the most common defects, such as a drooping head, round shoulders, flat chest, beginning spinal curvature, etc., result from a weak and relaxed condition of the muscles, whose function it is to move and support these parts. If the head is constantly bent forward in studying and writing at the desk, the muscles at the back of the neck gradually lose their tone, and stretch out like a piece of elastic that is constantly kept on the strain.

The exercises selected must be such as will strengthen these particular groups of muscles, and, while taking the exercises, the entire attention must be concentrated on the part being exercised.

Any lack of symmetry in the chest, spinal curvature, or actual weakness of the lungs will necessitate the prescribing of special and carefully selected exercises.

As to the exercises themselves, they should be so arranged as to bring into play in a methodic manner all the muscles. All special and corrective work must be supplemented by general work, which will increase the organic vigor of the heart, lungs, and chest necessary to meet the vital demands of the whole system. Games are, of course, most useful for this purpose, but the games should not be too violent.

In most free exercises the limbs are used for weights of … weighing one hundred and fifty

the arms usually weigh about ten pounds each legs twenty pounds.

The Causes of Round Shoulders.—The general conditions are those that produce muscular or constitutional weakness, as rapid growth, overwork, the impure air of ill-ventilated rooms, acute illness, near-sightedness uncorrected by glasses, lack of proper exercise, and the wearing of clothing supported by suspenders bearing on the points of the shoulders, tending to pull them downward and forward, or even to produce a painful deformity of the scapula.

It is the rule rather than the exception to find, with round shoulders, some inequality in the height. The right shoulder is apt to be the

the erect position of the body, and from early childhood especial attention should be given to develop and strengthen this region of the body.

The normal movements of the spinal column are flexion, extension, side bending, and torsion. Flexion and extension take place, for the most part, in the lumbar and cervical regions.

Gould believes that astigmatism is a prominent factor in the causation of spinal curvature; the curvature is affected by the tilting of the head to one side in reading or writing.

But a faulty postural habit is probably the most frequent cause both in standing and at the desk. When the weight is supported by the right leg, the left being used merely as a prop; there is a marked C-shaped curve produced, with a lowering of the right shoulder and prominence of the right hip. This position is assumed by school children for long periods of time, and there is a consequent overstretching of the ligaments of the spine and hip. These cases are generally accompanied by round shoulders and flat chest, protrusion of the abdomen, and rotation of the vertebræ.

A muscle can be developed only by the active contraction and relaxation of its fibers. Continuous tension quickly tires and lowers its tone, so that exercises given for increasing muscular power should be comparatively quick and frequently repeated, while those that aim at the stretching of muscles and ligaments should be slow and long maintained.

In all cases where corrective treatment is needed the first thing to be attended to is the general condition, and the best hygienic conditions must be provided, the general health inquired into and attended to. In all cases the eyes should be examined by a competent oculist.

All exercises and stretching movements should be given daily, with a period of rest after three or four movements, and they should be so alternated and combined that no

nploying the same muscles in the same way, should one another, and so cause excessive fatigue.

Muscles of the Abdomen.—These muscles are most ant for breathing and therefore for health, for the on in their normal position of the various abdominal, for good digestion and regularity of the evacua- the bowels. Sluggish digestion and constipation ong the commonest evils in life, and they are gen- connected with relaxed abdominal walls and flabbi- the abdominal muscles. Active pressure of the inal muscles on the viscera massages the liver and onward the contents of the intestines.

protuberant abdomen may either be due to a faulty n in standing or an excess of fat in the great omen- membrane intended to protect the bowels. This of fat may be in turn due to lack of exercise or an of sweets and starchy foods, and the reduction of perfluous fat by suitable exercises, properly taken, er with the attention to the diet, *not starvation*, is y common sense and safe way for a woman to reduce

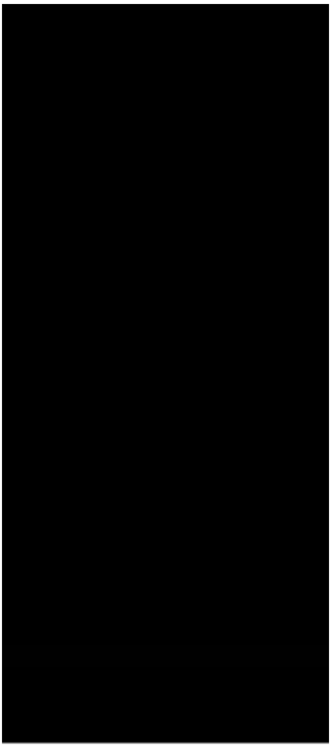
Fig. 28.—Correct attitude in standing.

Fig. 30.—Correct attitude in walking. First position.

Fig. 31.—Correct attitude in walking. Secohd position.

Fig. 32.—Shoulder-blade exercise. First position.

Fig. 33.—Shoulder-blade exercise. Second position.



While each exercise calls into play many other muscles than the ones for whose development the exercise is given, the exercise is classed under the group for the region which it is especially designed to benefit.

The dances were selected, hoping that the graceful attitude of the dance shown would be a forcible object-lesson of what might be attained in the correct poise, carriage, and grace of motion, not only in walking, but in all the movements of the body.

A study of the poses of the dance will demonstrate that, for developing the arms, strengthening and giving grace to the movements of the wrists, they are greatly superior to the free exercises.

As the poses of the dance can be readily studied from the plates, no further description was thought necessary.

Shoulder-blade Exercises (Fig. 32).—*First Position.*—Stand erect, with the feet nearly together, and the palms of the hands brought together above the head in the manner shown in the figure.

Second Position (Fig. 33).—Throw hands and forearms backward, keeping the arms on a line with the shoulders, the elbows bent, and turn the palms forward, as represented in the second position of the figure. Return to the first position, and repeat ten times. These exercises strengthen particularly the muscles between the shoulder-blades, whose function it is to hold the shoulders back.

The first point in taking each exercise is to learn the correct attitude before a mirror; after this has been mastered, the exercises should be taken with a considerable amount of rapidity and force, but not so forcibly that the collar-bone projects at its junction with the breast-bone. In throwing the hands and forearms back, the force of the motion should come at the elbows, not at the hands, and the shoulders should be carried as far back as possible.

Shoulder-blade Exercises, Number 2 (Fig. 34).—Stand erect, with the feet nearly together, and with the hands clasped behind the
figure. Then force the head

letting the elbows come forward. Repeat ten

ll be readily seen that these shoulder-blade move-
re exercises for the arms and chest as well. The
eing to raise and broaden the chest.

iratory Exercises (Figs. 35, 36, 37).—*First Posi-*
tand with the feet nearly together, the chin down,
s extended downward, with the backs of the hands
g, as shown in the figure.

d Position.—The chin should be raised with the
that in the second position the head is held erect.

l Position.—The movements of the hands are car-
ward still further and separated as shown in the
From this position the hands should be brought
rd in the large sweep of a circle to the original
.

these various movements have been accurately
d, forcible respiratory movements should be added.
o inhale forcibly as the hands are raised, and hold

Fig. 34.—Shoulder-blade exercise. Number 2.

Fig. 35.—Respiratory exercise. First position.

Fig. 36.—Respiratory exercise. Second position.

Fig. 37.—Respiratory exercise. Third position.

Fig. 38.—Exercise for forward projection of chest and retraction of abdomen. First position.

Fig. 39.—Exercise for forward projection of chest and retraction of abdomen. Second position.

Fig. 40.—Shoulder and back exercises. First position.

Fig. 41.—Shoulder and back exercises. Second position.

Fig. 44.—Squatting exercises for muscles of spine and abdomen.

This exercise is particularly valuable for projecting the chest forward, stretching the shortened ligaments, and drawing in the abdomen. Care should be taken to have the chin pressed backward when the arms are brought downward and turned outward.

Shoulder and Back Exercises (Figs. 40, 41).—*First Position.*—Stand erect, with the feet together, and both arms extended on a plane with the shoulders, so that in the first position the left arm is extended directly in front of the body and the right arm on the same plane directly behind the body. The arms must be held rigidly on the same plane.

Second Position.—By a circular movement, the position of the left arm is assumed by the right, and vice versâ. During the entire movement the feet must be kept firmly planted on the floor, pivoting at the hips only, while making the continuous circular movement of the arms.

These movements consist in a torsion of the body around the axis of the spinal column, and to these can be added deep inspirations from left to right, with expirations from right to left. In addition to the effect on the circulation, the respiratory movements keep up the nutrition and efficiency of the lungs, which in old age undergo a kind of atrophy, and also maintain the elasticity of the chest-walls, which are apt to become stiff through disuse, and so interfere with the movements of the lungs and pleura.

Leg Exercises (Figs. 42, 43).—*First Position.*—Stand erect, with the hands resting on the hips and the legs crossed at the knees, with the right foot in front, as shown in the figure.

Second Position.—Swing the right leg outward and around back to about eighteen inches back of the left foot, as is shown in the second position. Then swing the right leg outward and around, back to the first position.

Reverse the position of the feet, and perform the same movements with the left leg. The weight of the body must always be thrown on the advanced leg, and perfect

ıd balance should be maintained throughout the ıovement.

xercises are useful for purposes of relieving the l veins of the fatigued leg, because the movements large masses of muscles as those of the legs and lemand large supplies of blood, and consequent tion on the part of the heart to supply it, and this ouring swiftly back to the lungs for purification, frequent and deeper inspirations on their part to e purification; leg exercises cause greater develop- the chest than do arm exercises.

ting Exercises for Muscles of the Spine and n (Fig. 44).—Stand erect, with the feet near and the hands resting on the hips, rise upon the n sink the body to the floor, bending the knees until the thighs and legs are doubled upon each d the weight of the entire body is supported by . The trunk must be maintained perfectly erect out the movement. Then return to the original

Fig. 45.—Alternate kneeling; abdominal exercise.

Fig. 46.—Balancing exercise for poise and carriage.

Fig. 47.—Balancing exercise for extending depth of chest. First position.

Fig. 48.—Balancing exercise for extending depth of chest. Second position.

Fig. 49.—Lateral trunk and waist exercise. First position.

Fig. 50.—Lateral trunk and waist exercise. Second position.

looking directly forward, and the left hand extended above the head, and the right hand resting on the hip. The head and entire trunk are then turned slowly toward the right, and the position maintained for a moment, then return to the original position. Repeat five times for each leg.

These exercises strengthen the abdominal muscles, those at the side of the waist, and groins.

Balancing Exercises for Poise and Carriage (Fig. 46).—These exercises, for maintaining the equilibrium of the body while it is poised upon the smallest possible base, are among the most difficult positions to maintain, requiring a high degree of coördination of movement. They are given to improve the poise and carriage of the body.

The position of the right foot in the figure is incorrect, since the object of the movement is to have the body balanced throughout on the toes *only*. Stand erect on the tiptoes, with the arms and hands extended at the sides and above the head, as shown in the figure; then walk in the same position, with the hands carried up perpendicularly at the sides of the head.

Further benefits in the carriage of the body may be obtained by carrying light weights upon the head while performing these exercises, as a light book.

These exercises, when properly performed, expand the chest and bring into play all the extensors of the back and elevators of the shoulders. They also round out the muscles of the throat and neck.

Balancing Exercises for Extending Depth of Chest (Figs. 47, 48).—*First Position.*—Stand erect, with the heels together and the hands resting on the hips. Straighten out the right arm, and extend it perpendicularly up at the side of the head, and at the same time carry the left leg outward and upward as far as possible, according to the pose assumed in the figure. Then lower the leg and arm, returning to the original position.

Second Position.—Stand erect, with the heels together and the hands resting on the hips, as in the first position. Then take the same movements with the left arm and right

leg as were taken in the first position. The arm and leg should be raised and lowered simultaneously.

All these exercises increase the vertical diameters of the chest, and strengthen the muscles of ordinary and forced respiration.

These movements also relieve the engorged veins of fatigued legs.

Lateral Trunk and Waist Exercises (Figs. 49, 50).—*First Position.*—Stand with the feet nearly together and the arms extended above the head; the arms are relaxed at the wrists and elbows, so that a slightly curved line is formed, as is shown in the figure. First sway to the left, bending at the waist line as far as possible, and return to the original position.

Second Position.—The attitude is the same as in the first position; sway to the left in the same manner.

These exercises strengthen the muscles on the sides of the abdomen and the lower part of the back, and are an excellent means to reduce the size of the waist in case of corpulency.

Exercises for the Muscles of the Back (Fig. 51).—These exercises may be taken lying prone on the floor, with the feet caught under any piece of furniture which is strong and low enough to act as a cross-bar, as a lounge or dressing case. No one but an athlete could take this exercise without having the feet held down.

The feet should be held firmly down, and the hands may be at the sides or clasped behind the waist; the body is then slowly raised and carried backward to the half-sitting posture, then gradually lowered to the original position. These movements should be taken slowly and not repeated more than five times in the beginning.

In case of stooping or round shoulders, the hands should be clasped at the back of the neck instead of at the waist.

Raise the head and extend the spine, pressing the elbows backward. This exercise is a severe one on the extensors of the back and the rotators of the shoulders.

Fig. 51.—Exercises for muscles of back.

Fig. 52.—Exercises for muscles of abdomen.

Fig. 53.—Swimming exercises: for back, thighs, and abdomen. First position.

Fig. 54.—Swimming exercises: for back, thighs, and abdomen. Second position.

Fig. 55.—Rope-pulling exercises: for back, chest, waist, legs, and arms. First position.

Fig. 56.—Rope-pulling exercises: for back, chest, waist, legs, and arms. Second position.

Fig. 57.—Exercises in lateral trunk flexions: for shoulders, chest, hips, and legs. First position.

Exercises for the Muscles of the Abdomen (Fig. 52).—Lie supine on the floor, with the feet firmly fixed under a cross bar, or a piece of furniture which will answer this purpose, and the hands resting on the hips, as shown in the figure; slowly raise the body to the upright position, maintain for a moment, and return to the first position.

This and the preceding exercise are both excellent for strengthening the abdominal muscles and reducing an excessive accumulation of fat in case of obesity of this region.

Swimming Exercises: for Back, Thighs, and Abdomen (Figs. 53, 54).—*First Position.*—The movements given here are those for the breast-stroke in swimming. Stand with the feet about eighteen inches apart, with the right foot advanced and the right leg straight; the weight is thrown on the left leg, and the arms bent at right angles, ready for the beginning of the stroke, as shown in the pose.

Second Position.—Shoot the arms directly forward, incline the whole body forward, straighten the left leg, and throw the weight on the right, which should be bent, as shown in the second pose. Then sweep the hands and arms outward in a horizontal plane, until the arms, trunk, and legs are brought into the original position.

Then take the same exercises, reversing the positions of the right and left legs.

In taking these exercises the arms, body, and legs must work simultaneously. Special stress must be placed on the alternate flexion and extension of the front and rear leg and the inclination of the body forward with each stroke.

While these exercises strengthen the muscles of the arms, shoulders, and chest, they are especially intended for the extensor muscles of the back and thighs and muscles of the abdomen.

Rope-pulling Exercises: for Back, Chest, W Legs, and Arms (Figs. 55, 56).—*First Position.*- with the feet about eighteen inches apart, the e

ıt in front of the body and well out from the sides; foot is advanced, and the weight rests mainly on leg.

Position.—Clinch the hands tightly, as though a rope, and sway to the left side, at the same time ning the right leg; bend the left knee, and pull s toward the waist, as though pulling the rope in; nd the arms and return to the first position.

the exercise with the position of the legs re-

rms must be extended well out from the sides, at the waist-line, so as to increase the reach, and ing back and forth must be done with perfect y.

a good all-around exercise, as it brings into play ngthens the adductors of the thighs, calves, and of the legs, the broad muscles of the back, the of the chest, waist, and the flexors and extensors ms.

Fig. 58.—Exercises in lateral trunk flexions: for shoulders, chest, hips, and legs. Second position.

Fig. 59.—Exercises in trunk flexions: for back, abdomen, and legs. First position.

Fig. 60.—Exercises in trunk flexions: for back, abdomen, and legs. Second position.

Fig. 59.—Exercises in trunk flexions: for back, abdomen, and legs. First position.

Fig. 60.—Exercises in trunk flexions: for back, abdomen, and legs. Second position.

Fig. 61.—Chest weight exercises for arms and shoulders. First position.

well forward at the waist-line, while the legs are rigidly extended at the knees. Increase the bend gradually at the waist until the tips of the fingers touch the floor between the feet, as shown in the pose.

Second Position.—From the first position carry the arms directly forward, upward, and backward until they reach the position shown in the second pose, with the knees and ankles flexed; bend the trunk as far backward as possible, while the arms are extended over the head. Maintain for a moment, and return to the original position.

These movements must all be taken slowly, and in the beginning do not attempt to go far back of the vertical line. Nearly all the muscles on the front and back of the body are involved in these exercises, but the greatest strain comes on the muscles of the back and abdomen and the muscles on the back of the thighs. The bending and rising bring into powerful action the extensors of the back and neck and the retractors of the shoulders.

After this exercise has been mastered, it can be used to still further expand the lungs, by forcible inspiration when the chest is in the most favorable position for expansion; retain the breath while the trunk is flexed, forcing the air into the cells of the lungs under pressure. This last feature of the exercise should *not* be attempted by any one with weak lungs.

Boxing and Fencing.—Boxing and fencing are both excellent exercises for the lungs, for both sides of the body, for balance, for rapidity, for endurance, variety, promptitude, and sudden adaptation; for originality, up to a certain point, as well as for self-reliance and fearlessness. They have the advantage of cheapness, and are best practised in the open air.

Exercises with Chest Weights: for Chest Expansion, Shoulders, and Arms.—These exercises are excellent for developing the muscles of the upper part of the chest, and for rounding out the chest, shoulders, and arms. They are also good flesh-reducing exercises.

The weights should be fairly light at first, beginning

aps two and one-half pounds, and gradually in-
intil five pounds are used. The weights should
ncreased with the increase of the strength of
dual. All the movements should be performed
vely from ten to twenty times each; then pro-
e next movement.

ng any heavy exercise great care must be used
rfatigue the muscles, or more harm than good will
As soon as the muscles have become too tired
n any exercise vigorously, it should be discon-
d a rest of a few minutes taken, when the exer-
be resumed. When a point is reached at which
es feel tired at the commencement of the exer-
at once for the day.

Veight Exercises for Arms and Shoulders (Figs.
-First Position.—Face the chest weights, grasp
es firmly, and hold the arms straight out in front
est. Stand with the heels nearly together, and
h away from the weights to raise them a little
rom the floor.

Fig. 62.—Chest weight exercises for arms and shoulders. Second position.

Fig. 63.—Chest weight exercises for shoulders and chest expansion. First position.

Fig. 64.—Chest weight exercises for shoulders and chest expansion. Second position.

Fig. 65.—Chest weight exercises for extending depth of chest. First position.

Fig. 66.—Chest weight exercises for extending depth of chest. Second position.

Fig. 67.—Chest weight exercises for chest expansion. First position.

Fig. 68.—Chest weight exercises for chest expansion. Second position.

Fig. 69.—Figures of the dance. First position of the hands and feet.

horizontal position, throw them back as far as possible. With the arms still extended on a straight line with the shoulders, bring them forward until the hands meet in front. This is an excellent exercise to expand and develop the chest.

Classic and Esthetic Dancing: an Essential Feature in Physical Training.—From earliest antiquity the dance has been of universal practice among all peoples of the earth, both savage and civilized, and it has been made to express all the emotions of which the mind is capable of feeling. Dancing held a prominent position among the gymnastic exercises of the Greeks.

The teachers of physical training have long felt that even the combination of gymnastics and athletic sports left much to be desired in the carriage and movements of the body, so classic and esthetic dancing, which stands between the two, more closely allied to gymnastics in its movements and to games in its spirit, was introduced as an additional gymnastic exercise, to harmonize the movements of the body, and to produce an ease of manner with a grace of beauty and of motion.

Society Dancing.—A sharp distinction must be made between the modern gymnastic dancing and society dancing. In the latter, the waltz and the two-step always require a partner. The dancing is ordinarily confined to the ball-room, with its poor ventilation and overheated air; add to these the constriction of the waist, so that the free action of the heart and lungs is interfered with, and under these conditions it may even prove a dangerous pastime to the young woman with weak heart or lungs. As a physical exercise, the waxed floor of the ball-room still further reduces its value.

Gymnasium or Classic and Esthetic Dancing.—For the gymnasium dancing there must be, first of all, the loose dress and heelless slippers, and an abundant supply of fresh air at a proper temperature, while the foot grips the floor as tenaciously as in boxing or fencing; a smooth floor renders an artistic execution impossible. The floor

rough or covered with canvas, when dancing
s good a developer of the heart and lungs as
swimming.

good physical condition can keep up esthetic
r an hour with very few rests or pauses. The
in one hour is about equivalent to a walk of ten

steps in the attainment of grace of motion is
hort, angular, jerky movements, and to learn
ything, even the most difficult exercises, with
xpenditure of power and energy. This implies
le muscular strength and great muscular en-
nd control. As soon as the dancer loses her
poise, holds one arm too straight, and bends the
at too sharp an angle, or puts too much stress
ovement and too little on that, or makes too
t, the harmony is lost and gracefulness is not

dern gymnasium dancing conforms more com-
h the requirements of good exercise than ball-

Fig. 70.—Figures of the dance. Second position of hands; second position of right foot.

Fig. 71.—Figures of the dance. Third position of hands; third position of right foot.

Fig. 72.—Figures of the dance. Third position ("amplified") of hands; fourth position of right foot, in *front*. N. B.—When the arms are not in motion, the palms must be turned down.

Fig. 73.—Figures of the dance. Fourth position of hands; fourth position of right foot, in back.

Fig. 74.—Figures of the dance. Fifth position of hands; fifth position of right foot.

Fig. 77.—Courtesy.

Fig. 78.—Highland fling.

Fig. 79.—Hornpipe step "on heels," pulling down the small ropes.

Fig. 80.—Swedish step from "Kulldansen."

Fig. 81.—Circles with hands, from Spanish dances.

Fig. 82.—Combination of dance steps. First position

Fig. 83.—Combination of dance steps. Second position.

Fig. 84.—Combination of dance steps. Third position.

Fig. 83.—Combination of dance steps. Second position.

Fig. 84.—Combination of dance steps. Third position.

Fig. 85.—On the toe tips.

higher arch. Properly applied and directed, dancing exercises are even a cure for flat-foot.

The improvement noted in thirteen young ladies during twenty-five days by M. B. Gilbert is as follows: The average increase in the normal chest measure, from half an inch to one and a half inches; with the chest inflated, from half an inch to one and three-fourth inches.

The foundation for this coördinate work, from which an unlimited variety of the most valuable developing exercises is formed, consists of the long-established five positions of the feet and five positions of the arms, together with positions of the whole body, known as attitudes, arabesques, poses, elevations, groupings, etc. From these precepts are established, whereby steps, attitudes, and motions are systematically arranged, according to the method, and in strict harmony with time and cadence of music.

The freedom given by such dancing softens the crude awkward positions so universal among young people; the general carriage invariably improves as the head goes up and the shoulders go back; a more elastic tread and an easier propelling of the body in walking is gained. Not only is the chest broadened and deepened, and fat removed from waists and hips, and weak backs strengthened, but students gain in quickness of perception, coördination, and judgment, as well as in agility and power to keep their feet in correct rhythm.

Esthetic dancing is particularly recommended in all factories, stores, and schools where there are any large number of girls and women as a recess exercise, because in this way they get a great deal of vigorous exercise in a very short time. It brings all the large muscle groups into action, causes a rapid circulation of the blood, aërates the lungs, and it affords the best possible sort of a contrast to their monotonous and cramped positions; it is most exhilarating and it is good fun. It is an excellent mental tonic and physical invigorator; it brightens the day, and enables the women to do better work.

r **Exercise.**—Outdoor exercise must be regarded he essentials to good health, and as such must with food, clothing, bathing, and sleep.

ion to the beneficial effects of exercise on the rculation, and all the functions of the body, are ng effects of outdoor life on the nerves. It is f-doors, in the parks, in the country, or by the ne is soothed into entire oblivion and forgetful- cares of life, and to such a degree that the in- ay be said to be hypnotized by the powers of that the mind is almost as perfectly at rest as in eep.

e spent out-of-doors should not be less than daily. Actual experience of busy workers will not only is this time not lost, but that actually better work can be done in the day, and that the mprovement in the general health will be so much less time will be lost through indisposition l sickness, so that the daily outdoor exercise

side may be dangerous for many a one who is able to walk at a moderate speed on level ground.

In walking the clothing must be sufficiently loose not to interfere with the more rapid respirations and the increased action of the heart. When the heart cannot keep pace with the demanded speed of the circulation, a "stitch" ensues, and getting one's second wind means that the heart has succeeded in accommodating itself to the strain. Too great a "stitch," resulting in absolute breathlessness, is a warning that must not be disregarded.

This increase in the respiratory action is important, as compared with the brief and transient increase from exercise with apparatus, because a quick walk can easily be kept up for several hours.

The fatigue is small, because, in the first place, of the abundant supply of oxygen; the will is scarcely used, and walking is almost automatic, partly because the muscle areas used are large, and each movement prepares for the next. Walking is a heart and lung exercise of a very excellent sort.

The Effect of Walking on the Movements of the Blood in the Legs.—The circulation of the blood depends on the pumping of the heart, which is in turn affected by the suction action of the lungs and the muscular movements of contraction and relaxation which go on rhythmically. While in prolonged standing the veins of the legs become fuller, and the circulation of blood in them more sluggish, and by the laws of gravitation the blood is kept down in them. Hence also in walking slowly with short steps the legs remain overfull of blood and become heavy. Instead of being quickened, the circulation is actually hindered, for the waste-products are not carried away quickly enough. Hence, slow walking soon causes a feeling of fatigue, while the vigorous walker, going along with long strides, keeps fresh.

Rules for Long Walks.—In walking, not only the distance should be taken into account, but the character of the road and the incline of the ascent. A distance that

easily covered on a smooth, level highway may
uble the expenditure of muscle and nerve force if
nd is sandy or very damp. Other hindrances to
into consideration are opposing winds, not only
of the resistance, but also because of the inhala-
ust and rain.

lk should be occasionally broken for short periods
The pauses should be short, about five minutes,
ng this time the body should be erect. Experi-
ves that sitting down makes one more tired on
p again. A short halt should be made before
a steep ascent, so as to begin with fresh strength
breathing, as this means increased work for the
d lungs.

ting out for a walk, one should begin slowly, and
increase the pace, and in returning the same rule
e observed.

ng.—The force exerted in running is enormous.
ng it is the length of the step more than anything

for instance, for fifty feet; then increase the speed gradually, but when running for exercise, never speed to the utmost, as this is not necessary for the benefits of the exercise. Always close the run with the same moderation with which it was commenced; that is, never stop short, as this sudden arrest of action gives a most undesirable shock to the heart. The movements of running may easily be imitated in the house, while standing in one place, and simply lifting the feet in the same quick alternation from the floor.

Mountain Climbing.—The advantages of mountain climbing are manifold. The weight of the body has to be carried up a certain height. To accomplish this the work of the muscles is increased; the breathing must be deeper to satisfy the increased demands for oxygen; fresh air is admitted into the apices of the lungs, which do not, as a rule, participate in respiration. A more powerful action of the heart takes place, but care must be taken that this is not carried too far. Slow climbing, without any unnecessary waste of energy and with appropriate pauses, to allow the heart to recover, is advantageous. One should not talk too much while climbing. The dress should be suitable; the neck must be free and the shoulders not heavily weighted, so that they may be drawn back and the chest fully expanded.

Swimming.—Of all outdoor exercises for women, swimming is one of the most perfect. It not only calls into vigorous action most of the muscles of the body, but spares many of those muscles which are so commonly overworked, most of the work being performed by muscles which are so little used as to have become weak and flabby.

For instance, the extensors of the fingers and the hand, that are so constantly stretched in sewing and writing, are in constant use in swimming, while the corresponding flexors, the slaves of the needle and the pen, are relaxed. Again, the muscles passing from the shoulder-blades to the trunk, on which depends much of the erect carriage and strength of the chest, which have become wasted from

hile the woman sat at the desk or bent over her are the very muscles by which the movements pper half of the body are executed, while all the of the lower extremity are brought into use. ial value is the free movement of the hip-joint, a t is seldom moved with any degree of freedom time a girl leaves climbing trees, unless she has ntage of special gymnastic training. The vigor- n demanded of the respiratory muscles greatly the chest capacity.

ody is lighter than the water, and is perfectly d by it, so the weight is taken off the spine, and cles of the back are relieved from their normal tension. The head is the only part of the body eld up by muscular action, and, in floating, even pported by the water.

isadvantages arise from the fact that the tempera- he water is very much below that of the body, here is a greatly increased conduction of heat from

the proper precautions, this reaction does not occur, it is a contraindication to sea-bathing and swimming.

If the immersion has been too prolonged, there is a second sensation of chilliness, a signal that the bather must leave the water at once.

The best time for bathing is between eleven o'clock in the morning and four in the afternoon, depending on the tide. No one should go into the water within two hours after meals, nor should she on leaving the bath proceed at once to the table, since digestion draws the blood from the periphery to the stomach, and to eat immediately after bathing is to lose most of the benefit of the saline treatment.

All should avoid cold-water bathing when fatigued, and swimmers ought to pay especial attention to this point, on account of the demand they are going to make on their muscular system; and on no account must one enter the water when in a perspiration; a moderate walk along the shore should be taken until the perspiration has subsided. These precautions are of the highest importance, and disregard of them may prove fatal.

Enter the water quickly until it reaches the waist, then plunge headlong, or cover the body to the neck. Care should be taken to wet the chest and abdomen immediately on entering the water, since these parts are the most sensitive to the impression of cold.

Every one should learn to swim, and those who cannot must move the arms and legs about vigorously. The duration of the bath should depend on the state of the health of the individual, on the state of the weather, and on whether the water is rough or calm. The average duration of the time spent in the water should be from three to fifteen minutes, the latter being the maximum time for any one. No benefit will accrue from spending a longer time than this in the water, and much harm may result.

The sea-bath should be followed by moderate exercise, in order to insure a perfect reaction, and to aid in expending the superfluous energy which sea-water imparts.

ning and sea-bathing should be avoided by per-
o have weak hearts and a poor circulation, in
e reaction after a plunge into cold water is never
blished. Also by persons with heart or kidney
and by all feeble and old persons.

s with feeble constitutions, but with no actual
s in various forms of nervous disorders, insomnia,
erally derive marked benefit from sea-bathing.

s who are weak should walk and not plunge into
r. As in all other exercises, a determination on the
he weak to equal the strong is a fertile cause of

back Riding as an Exercise.—The advantages
for horseback riding are that it acts on nearly
scle of the body, while the mind is interested and
l. An insuperable disadvantage to the majority
n living in large towns and cities is the enormous
he exercise.

lue of horseback riding for women has been greatly

In correct and graceful rowing there is a pendulum-like movement from the hips. The rower should sit with the trunk fully extended, the head up, the eyes to the front, the chest thrown forward, and the weight of the trunk equally distributed upon the two sides of her seat. The feet rest against the stretcher, the two hands should be near together, and should be held symmetrically at an equal distance from the body.

Stretching.—The body and extended arms are brought forward as far as possible. The spinal column should be kept extended, not bent so as to make a crooked back, and the trunk should be thrown forward from the hip-joints. When the stretch has reached its forward limit, the oar is dipped into the water just far enough to cover it; then immediately the pull begins, and it must be continued evenly to the end.

The Pull.—The body rises erect from the hips and swings backward. The hands should not reach the front of the chest until the body has passed the perpendicular and is sinking back. When the pull is finished, the hands are dropped and suddenly bent toward the wrists. This lifts the oar out of the water, and keeps its lower surface parallel with it; during the stretching forward, the oar is kept parallel with the water, so that it has not much resistance from the air.

The muscles brought chiefly into play are the long muscles of the back in the backward swing, and the abdominal muscles in the forward swing. But the muscles of the pelvis, thighs, and legs all have to work, likewise the muscles of the arms, chest, and shoulders. And it is one of the best exercises for developing the lungs and chest, as well as of strengthening the heart. Fatigue will be felt most in the muscles of the legs, hips, and arms, but the exertion is so well distributed that it causes much less fatigue than would otherwise be the case.

Athletic Sports.—Athletic sports possess three distinct advantages—they are played out-of-doors, and give an incentive to taking the proper amount of exercise; they are

ı games, and so develop the social and coöperative ınd last, but by no means least, they afford a great amusement and real recreation.

ıal and systematic gymnastics are essential for the ›ment of the body and the correction of its defects; loor exercise is excellent, but the solitary walk, swim, or row leaves much to be desired, while in ; especially the mind is free to pursue the same of thought which with it was occupied at the desk, it fails to be properly refreshing to the mind and Whereas in all athletic sports the ego has to be into the background, with all its interests, the ork left behind, and the entire attention concen- on the play. This is a very distinct advantage to ividual.

ıen at all ages take themselves and life too seriously. in all probability due to a defective early education; ı the long school hours, home study, housework, ving, they had neither time nor opportunity to cul- ı love for play and games, and so the play instinct

yet what one's opponent does is so vital to the success or failure of the game that the player must decide quickly and accurately how that move in the game can best be met, so that intense concentration, quickness, alertness, prolonged attention, self-control, and even self-sacrifice are called for, for in the team game the individual interests must be submerged, in order that the side may win; and so the individual power, sense of responsibility, and an *esprit de corps* are developed, in a manner almost impossible in the same degree in any other way.

The principal outdoor games for women are croquet, lawn-tennis, hockey, golf, hand-ball, basket-ball, baseball, boxing, and fencing.

Croquet.—Of all these games, croquet is the mildest, and for that reason is a good beginning game for a woman who has always led a sedentary life, or for a woman who has become enfeebled through serious illness. It is also an excellent game for old age.

To be beneficial and not detrimental, the exercise must be very gradually increased, both in the length of time occupied and in the vigor of the movements. The muscles must be slowly built up and improved in tone, the lungs developed, and the heart strengthened.

Another advantage of croquet is that it is inexpensive and requires a limited amount of ground.

Lawn-tennis.—Tennis is a much more violent exercise than croquet, and is a game for young people and youth. Now, as to just what constitutes youth: it is altogether a question of the condition of the arteries, heart, and muscular system, and is not a question of years *per se*.

The game is moderately expensive; played with four, it is not at all violent. It is an excellent game for social purposes, and can be kept up until late in life, but it cannot be begun late in life. It has just the proper amount of variety, activity, and endurance to suit hundreds of people for whom croquet would be too mild, and for whom ball-games would be too severe.

Golf.—Golf is deservedly a very popula[illegible]me at all

'erhaps the greatest drawback for the city dweller accessibility of the golf links and the great expense ame.

nbines scenery, walking for several miles, some hill , and a considerable amount of exercise for the e of the body, particularly for the right arm, and cles of the right side of the back and chest. The awback, from the physical standpoint, is an overnent of the muscles of the right side of the body, the majority of people, are already better develn those of the left side; the muscles of the left side ody are brought very slightly into play.

the distinct advantages of the game are combined lking, the healthy body swings, the accuracy n making the drives, the distance of the drives, the of implements as well as of stroke, and many other , and, further, it is a game that keeps one pleasantly d in a company of one's choosing for several

ey.—Hockey is among the finest of games for

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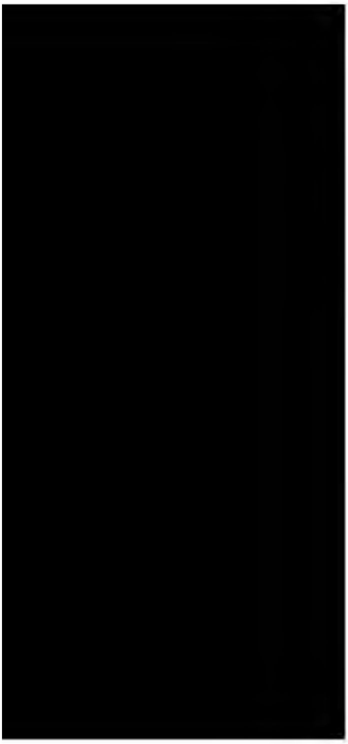

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